THE MAGAZINE

OF

Useful and Entertaining Knowledge.

"Get wisdom: and, with al thy getting, get understanding."

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EDUCATION.

PRACTICAL REMARKS.

BY THEODORE EAMES.

[Concluded from page 216.]

The mind, in order to be healthy and vigorous, must be employed; action is its natural state, and all experience shows, that if useful and profitable subjects be not presented, on which it may exercise itself, others of an opposite character will force themselves upon its attention, in its hours of vacancy; and thus the garden that with proper culture would have yielded fragrant flowers and wholesome fruits, will be overrun with barren and noxious weeds. A habit of employment, of regular, stated application, is the lever by which the busy world is moved, and it is of immense importance that this habit be formed and fixed in early life; that it should grow with the growth, and strengthen with the strength of the individual, till action, both mental and corporeal, becomes as natural and easy as the pulsations of his heart; and happily there is no lack of means for vigorous and profitable occupation. Besides the countless multitude of professions, trades, and pursuits that engross the attention and swallow up the time of our ever active and enterprising coun-

trymen, the stores of general literature furnish an inexhaustible supply of useful and interesting subjects for mental effort. Many of these subjects derive new value and importance from the unparalleled ardor with which the several departments of trade are prosecuted among us. The wide sea of business can never be at rest, nor its surface ever stagnate, while such multitudes are perpetually plunging into its tide, and buffeting its waves with hearts of controversy, in the pursuit of fortune. The skill and hardihood of American navigators have become proverbial. Neither the scorching heat of a tropical sun, nor the frost and "thick ribbed ice" of the polar regions, are sufficient to repress their zeal in the pursuit of fair and honorable traffic. With an industry that never tires, and a courage that never quails, they whiten every sea with their canvass, and wind their way to every corner of the globe, accessible by man. The competition with each other, and with the trading world at large, which grows out of this restless spirit of enterprise and activity, produces a necessity, greater than ever existed before, for enlarged views and extensive information on topics connected with the commercial intercourse of nations. A short-sighted, ill informed man, never would make his way to wealth or competence, by his own exertions, through such impetuous justling crowds as throng the streets of this great commercial metropolis. Those who are destined to this department of life, must possess a knowledge of the various and ever shifting channels in which the streams of mercantile business flow, or they cannot avail themselves of the advantages they afford in the prosecution of their favorite plans, nor take the tide of their affairs at flood, and so lead on to fortune. They must also possess an intimate acquaintance with the causes and events which check and control these streams, and give them, from time to time, new directions, or they will run the hazard of being plunged into irretrievable ruin, or of being doomed to see their frail barque in the midst of her apparently successful course, suddenly wrecked upon some of those "shallows and miseries" with which the voyage of life abounds. A merchant, for example, cannot plan a voyage judiciously, without a knowledge of the situation of the various countries of the world, and of their chief articles of traffic, both of

import and export. This single circumstance suggests the value, and evinces the great practical utility, of the study of Geography; nor is it confined, even in a commercial point of view, to the knowledge of the situation, extent, climate, and productions of foreign countries; it applies to the wide extent of our own with almost equal force and propriety as to the world. But its utility, as a branch of general knowledge, and its indispensable necessity to the scholar and man of reading, give it high and undisputed claims to a place among the subjects that constitute a polite course of education; without it the historian and the traveller are almost unintelligible, and even a common newspaper can scarcely be read with profit or pleasure; we naturally wish to know the scene of the events of which we read, and always feel the strongest interest in those with whose locality we are best acquainted. In truth, there is an indistinctness and obscurity attending those incidents which are merely represented to us as having taken place some where or other on the face of the earth, that give them an air of improbability and fiction, and we actually experience some difficulty in bringing ourselves to admit and realize the existence of facts of whose "whereabout" we have no distinct and definite idea. There is also a restless curiosity in man, an irrepressible desire to be informed of what is passing in distant portions of the globe. We wish to know the prevailing manners, customs, habits and employments of the men of other climes: what is their local situation, their means of subsistence, the facilities they enjoy for intercourse with other nations, their religious rights and ceremonies, their forms of government, their literature and arts, and even their personal appearance and complexion. The practical utility as well as personal gratification to be derived from these particulars, render them proper subjects of attention and investigation. They open to the mind a wide field of observation, and store it with a rich variety of interesting topics of remark and conversation that will serve the valuable purpose of keeping the mental powers in wholesome exercise, and of preventing that stagnant sluggishness of mind, which is the necessary consequence of inaction. An additional recommendation to this interesting branch of study, is derived from the enlarged and

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comprehensive views which it gives us of the power and goodness of the Deity. It is always a profitable exercise to contemplate the works of nature, and to look through nature, up to nature's God, with exalted and adoring views of his greatness and majesty. A survey of the surface of the earth is eminently calculated to impress the reflecting mind with a deep sense of the wisdom and benevolence of the Creator, as displayed in the manifest adaptation of the several parts of its surface to the nature and condition of their respective inhabitants; and an observant eye can see in these dispositions and arrangements, much of that tender regard for the welfare of his creatures which has been beautifully represented as "tempering the wind to the shorn lamb." There is something, likewise, sublime and elevating to the feelings, in the contemplation of the vast oceans, seas, mountains, and rivers, that diversify and checker the surface of our world. The apparatus used in the prosecution of this study, places the pupil, as it were, upon the summit of a lofty mountain, and shows him all the kingdoms of the earth, at a single glance. The delineations of his maps bring the remotest portions of it together, and give him a much clearer comprehension of their relative situations, bearings and connexions than he could possibly obtain by actually traversing those regions. The wide circumference of the globe is spread out before him in a perfect plain, and the entire whole lies spell-bound within the magic circle of his map, and subjected to his inspection, in the most complete and perfect manner of which the subject is capable. And with the world all thus before him, can a youth of intelligence fail to view with intense interest, even those imperfect outlines of the grand divisions and features of the earth? Can he ascend, without emotion, even in imagination, the lofty summits of the Alps, the Andes, and the mountains of Himmaleh? Can he look unmoved into those emblems of the infernal pit, the burning craters of Vesuvius, of Ætna, and of Cotopaxi? Can he behold them unawed when in their "magnificent wrath" they vomit forth flames and smoke, and deluge the surrounding country with floods of liquid fire? Can he behold the everlasting rolling of the Ocean, the incessant heaving of its billows, and listen to its eternal roar—can he follow with his eye

the innumerable rivers, as they course over the surface of the earth, and like the veins and arteries of the human frame, convey streams of life to every region, and impart freshness, and vigor, and beauty, to the face of nature? Can he do all this, and not feel his soul enlarged, his heart expanded, his thoughts elevated, and his mind instructed and improved by the exercise? Impossible! The warm, the generous and enthusiastic character of the youthful mind, and even the nature of man itself, must be sadly changed, before he can contemplate all these wondrous works and operations, without raising his thoughts to their Divine Author; and without feeling himself more closely allied to the great family of man, and consequently more sensible of his social duties. Surely a study of so much practical utility, and of such moral influence, is entitled to a place among the subjects of pursuit in every literary institution.

Upon the catalogue of studes that go to make up a polite and finished education, the Latin and Greek languages hold a conspicuous place. From their inherent excellence, they have, for ages, been regarded as indispensably necessary to the formation of a sound judgment and correct taste on literary subjects, upon the same principle that the master pieces of ancient sculpture, painting and architecture are still appealed to as standards in those departments, and made the criterion by which to judge of symmetry and elegance in modern works of the same classes. But in the indiscriminate zeal which has recently prevailed for decrying every thing old in the system of education, these languages have been assailed with a full share of obloquy and virulence. They have been represented by their opponents as possessing nothing of a practical nature to recommend them, and as being confined to the humble a-b-c-darian office of teaching mere words, without any practical or useful application. Compared with mathematical science, they have been depreciated, as having no applicability to the mechanical arts and operations of life; as having no tendency to teach man how to live, or how to conduct in the various situations in which he may be placed. The press has groaned under the loads of labored philippics which have been composed and published for the purpose of disparaging them, of denying

their claim to constitute a part even of an academical and collegiate education, and as meriting perpetual banishment from the halls of literature and science. These denunciations have gained a limited and temporary currency, and it is believed to be only a temporary one, partly from the influential names with which they have been in some instances unhappily and unnaturally associated, partly by the respectable and popular character of the publications through which they have found their way to the public; but chiefly, it is believed, from the confident air with which they have been uttered, and from that rage for innovation which has spread so widely over our country, and which, under the specious name of improvement, has infected so large a portion of the community, that the friends of classical learning have been almost afraid to avow their fondness for it, or to insist upon its salutary and invigorating influence upon the mind. But is all this censure just? Is there no mixture of prejudice and partial haste in these sweeping condemnations? Are they the result of actual experiment? Is it true, in point of fact, that we can attentively and understandingly peruse the Iliad of Homer, or its younger sister, the Odyssey, possessed of even greater interest, of milder and more attractive charms, and learn no lessons of practical wisdom from the experience of Nestor, or the cautious prudence of Ulysses? Can we drink in the pure and limpid stream which Virgil drew from the Castalian fountain, without feeling our intellectual spirits refreshed and invigorated by the draught? Can we follow the majestic march of Tully's mind, as he thunders in the capitol, making even Cæsar tremble by the impetuous bursts of his eloquence, or listen to the sound and deep-toned morality of his offices and other ethical works, without deriving from them principles of action which may daily and almost hourly be reduced to practice? We feel constrained to say, that many of the most inveterate opposers of this department of learning know, by their own experience, that it cannot be so; and could they be persuaded to speak dispassionately on the subject, they would acknowledge themselves to be indebted to those very languages for all the force and vigor which their fulminating declamations possess. This is making a most ungrateful and unhallowed use of

the gifts of learning. It is sacrilegiously setting fire to the temple of the Muses with a torch lighted at their own altars. But the truth is not as is thus represented, to the injury of classic lore. Its pages abound in the soundest maxims of practical wisdom; they abound in the most valuable lessons for the conduct of life; they furnish an exhaustless store of just and noble sentiments; of sentiments that "give ardor to virtue and confidence to truth" they are illuminated with elegant and sparkling thoughts, with felicitous and finely turned expressions which form an invaluable treasure to the mind; they give strength and vigor to the judgment, vivacity and sprightliness to the imagination, correctness and purity to the taste, and a polish, refinement and brilliancy to the whole intellectual man, which are seldom if ever obtained from any other source. As specimens of sublime and elevated conceptions, of graphic and natural description, and of refined and cultivated taste, the compositions of the ancient Greeks and Romans stand unrivalled in the literary history of the world. This superiority, indeed, might naturaly be expected from them. They wrote for fame----they lived for fame----and they died for fame. Unacquainted with the life and immortality brought to light by the Gospel, they labored for an immortality of their own creation, founded upon individual, personal distinction and aggrandisement, and as their characteristic discernment taught them that the achievements of the mind would long outlast the most durable monuments that physical power could raise, they devoted their utmost efforts to the perfecting of their intellectual labors, and spent their days and nights in giving them all the precision, spirit and energy of which they were capable, and the highest polish they could possibly impart. We have, therefore, in their writings, the best thoughts of their most learned men, clothed in the most appropriate, expressive and elegant terms which their language afforded; and as no people ever excelled the Greeks and Romans in genius and intellect, they have left, as was to be expected from all these concurrent causes, specimens in every species of writing, that have served as models for imitation to all succeeding ages, and no competitor has yet been found who has ventured to claim decided superiority over them. They are still invested with the

authority of oracles in all questions of elegant literature. They are still studied and read, with a view to train the mind to just conceptions, and correct and rational conclusions, and the testimony of all experience conclusively proves that the genuine influence is, to enrich the understanding with a vein of correct and chastened thought; to give its conceptions a ripe and mellow consistency, and to impart to its productions a raciness and pungency that are not to be found in the result of any other culture. In addition to this, the Latin language is the parent of all the living languages of the south of Europe, and a thorough knowledge of its forms the best possible preparation for the acquisition of them; and as these languages are becoming more and more important every day, in a commercial point of view, and begin to be regarded as essential, both to the scholar and the man of business, a new and powerful argument in its favor is derived from this circumstance. Our own language, too, claims kindred with those of Greece and Rome. They are both so largely incorporated into it, that a complete and thorough acquaintance with its principles and philosophy can scarcely be attained without them. The Greek, in its meridian glory, was doubtless the most perfect language that ever was spoken. Its flexibility and capacity for expressing the nicest shades of meaning are unparalleled, and its character for simple dignity is so strongly marked as to justify the apophthegm which is reported to have been uttered respecting it, that "if the gods should condescend to speak to men, they would use the language of Plato." We regard it as an auspicious circumstance, that a copious and beautiful Greek and English Lexicon has recently been presented to the American public, by one of the first philologists and classical scholars in the country. The Lexicon, published in Boston by the Hon. John Pickering, to which we refer, is with great care and judgment adapted to the use of schools and colleges, in our country, and is in all respects worthy of the high reputation of its author, and of the confidence and patronage of the literary public. Its copiousness as a vocabulary, and the precision and accuracy of its definitions, render it a most valuable acquisition to the Greek student, who cannot fail to give it a cordial welcome, as affording a direct and easy access to that rich and elegant lan-

guage, and as supplying a desideratum which has too long existed in that department of literature. The study of language in general appears to us to be one of immense advantage to the youthful understanding. When judiciously conducted, it brings the mental faculties into constant and highly beneficial exercise. It keeps up an invigorating and healthful motion in the mind, without tasking it beyond its capabilities. Its demands are just enough to call its powers into wholesome action, without wearying and exhausting them. In selecting from the various shades of meaning which the leading words of a sentence bear, that which will best suit the general scope and design of the passage under consideration, the discriminating faculties, the judgment and the taste, will all be put in requisition; and thus the study of philology will combine with the solid advantage of mental discipline, the gratifying acquisition of several languages, and by enabling the pupil to look abroad into the fields of foreign literature, will enlarge his sphere of intellectual vision, and raise him above the dead level of a single tongue. It will enable him also to breathe the literary atmosphere of other lands----to inhale the breezes of "delightful France," and the soft and classic airs of Italy and Spain, braced and strengthened by the cooler and more invigorating currents of central and northern Germany. In connexion with this subject it may also be remarked, that the absolute necessity there will be of comparing the several clauses of a sentence with each other, and with the context of studying the words merely as the vehicles of thought, and of ascertaining their true sense and meaning, in order to select the phrases and expressions most proper to convey that meaning in his own language, will give the student a clearer, more comprehensive, philosophical and accurate knowledge of the idioms, etymologies, and general principles of his mother tongue, than could be acquired by studying that tongue exclusively for the same length of time.

But it must be entirely useless and unnecessary to insist further upon this topic, or to proceed to a direct and particular recommendation of such branches of education as history, rhetoric, moral philosophy, the higher parts of arithmetic, algebra, geometry, astronomy, the construction of maps and charts, and various other

branches, which are proper to be pursued in every school, as soon as the several classes shall have reached them through a regular course of elementary instruction in the preparatory studies. These will all be found to be valuable and profitable subjects of attention, both from their intrinsic importance, and as means of disciplining the mind, and of contributing to the increase and strengthening of its faculties; but we are fully convinced of the pernicious consequences of hurrying pupils forward into departments with high sounding names, without a competent knowledge of what ought always to precede those studies. It should be our object to make correct and thorough scholars in whatever is attended to in the school, rather than showy proficients in a large number of pursuits, convinced as we are, that it is much better to understand a few things well, than a great many superficially. In order to secure the desired degree of thoroughness on the part of the scholar, the cooperation of the parent or guardian is necessary. Indifference and want of interest on their part respecting the proficiency and standing of the pupil, is always understood by him to be an indication that the subject is not one of much importance. He naturally infers, that if his parents, and those whom he knows to be most interested in his welfare in other particulars, make no inquiries, and manifest no solicitude, to know how he is advancing in his studies, it cannot be a matter of great concernment—and in this he reasons correctly----and comparing this indifference respecting his education, with the deep and lively interest which he sees them take in his other pursuits and accomplishments, of a merely personal and exterior character, he is strengthened in his opinion, and can hardly fail eventually to arrive at the conclusion that of all acquisitions those of the mind and understanding are of the smallest consequence. Upon a mind thus biassed, thus prepossessed, the exhortations, reproofs and admonitions----,and even the most assiduous efforts of the most faithful and conscientious instructor,----can make but little if any impression. After his best exertions have been used to excite in his pupil an ambition to learn, there will still be wanting the charm of a parent's interest and approbation to crown his labors, and to incite to greater vigor and activity. It ought to be distinctly understood, that the responsi-

bility of a parent does not end with barely sending his child to school, and furnishing him with the requisite books and apparatus to enable him to pursue his studies advantageously. These provisions, though indispensably necessary, are not of themselves sufficient to shift the burden entirely from the parent to the instructor. An important agency in aid of the instructor is still due from the parent. He must not fail to make direct and particular inquiries into the pupil's diligence and success in his studies, and to award him a just measure of applause or censure, according to his merits or demerits. We apprehend that parents are not generally aware, how much and how salutary is the influence thus exerted upon the scholar. We know, from observation and experiment, that it is very great, and worth vastly more than all the trouble it can cost to make the requisite investigations. They should feel and manifest a lively interest in the improvement of their children or wards; should inquire into the station they occupy among their classmates, and take especial care that they be punctual in their attendance at school. This item of the account is a very important one. Much greater evil results from interrupted attendance on school, and even from habitual remissness and tardiness, than is generally supposed. The loss of the particular exercises attended to in the scholar's absence, is by no means the whole extent of the injury sustained; though that, of itself, is a serious one; for it breaks the connexion which exists between the several parts of a subject, and which should always, if possible, be kept up in the mind of the pupil; it is leaving out one of the links of the chain which ought to be preserved entire, in order to give him a clear and comprehensive understanding of the subject of his lessons; but a still more injurious influence is felt in another particular: it withdraws the attention of the pupil from his studies, and fixes it, for the time, upon something entirely foreign from them, and it often requires much effort to regain the same degree of interest and engagedness in them which was previously felt. There is something also in the very atmosphere of a school congenial to improvement. Intelligence seems often to dart from one countenance to another, like rays of light, while a class are engaged in an interesting recitation, and mind appears

to impregnate mind with ideas, by an agency similar to that which is exerted by the pollen in a field of corn, which, though it would never render its original stalk productive, yet, by passing through the air to another, it communicates by its mysterious operations a prolific influence to that stalk, and causes it to bear. All the advantages which these causes are calculated to yield, together with the remarks, explanations, and illustrations of the instructer which accompany each exercise, are of course lost to the absent pupil; and, what is still worse, his mind is rendered less susceptible of impressions from these sources, by every instance of omission. Parents may also materially strengthen the hands of the instructer, by enjoining upon the pupil a strict regard to all the rules and regulations of the school; even those minute points of order which may appear, perhaps, to be little more than mere forms, but which in reality, when taken in the aggregate, preserve the equilibrium of the school, and, like the springs, and wheels, and balances of a watch, serve to regulate its movements, and to give precision, uniformity, and efficiency to all its operations. All good resolutions in the pupil ought invariably to be encouraged and commended, while every indication of a refractory disposition, of a disposition to infringe or evade the rules of wholesome discipline, should be promptly discountenanced and decisively repressed. A school without a just and reasonable system of discipline, would resemble a commonwealth without laws. Experience shows that even men cannot be trusted to live in a state of society without the restraints of laws and penal statutes; and are children expected to be more considerate, more discreet, more capable of self-government than men? Should we feel our persons safe from aggression, and our property secure from plunder and depredation, were all the penalties against assaults and batteries, and thefts, and robberies, struck from the statute book? Let the atrocious Salem murder, and the unexampled robbery recently committed, answer the question. No matter how imperative and severe the terms of the prohibition may be—"Thou shalt not strike"—"Thou shalt not steal"—may stand recorded in letters of fire upon the pages of the legal code, and may be uttered in a voice of thunder from the judgment seat—still, if there be no

sanction; no pain nor penalty annexed to transgression; instead of being a terror to evil doers, the law will inevitably become an object of scorn and derision. In such a community,—if it could exist at all,—the right of the strongest would soon become the supreme law of the land, the only title by which property and even life could be held. If men, therefore, who have arrived at the age of full maturity, and with all their ripened faculties in unobstructed exercise, cannot be restrained from violence and crime, by mere verbal prohibitions, is it reasonable to expect that children of tender age, of little experience, and often of limited views of right and wrong, should be withheld from improprieties of conduct, by a restraint so weak and powerless? It is vain to expect it. It would be ruinous to trust to it for the order and discipline of any school. From the very nature of man there must be in every well regulated community, whether political or literary, a judicious system of restraints and punishments for wrong doers; and although we heartily deprecate the necessity of resorting to them on any occasion, yet we cannot consent to the absolute and unqualified banishment of them from schools, until an effectual and unexceptionable substitute for them has been devised, and brought into successful operation. We believe it would be extremely injudicious and unsafe for any instructer openly to announce that personal chastisement would never be resorted to in his school under any circumstances whatever. The only substitute which we think ever likely to succeed, is a persevering effort on the part of the instructer to inculcate upon his pupils such principles as will induce them to adopt a manly, dignified, and unexceptionable deportment—a deportment founded upon a just sense of the importance of a right improvement of time; of the value of their opportunities for the acquisition of learning, and a fixed determination to derive the greatest possible advantage from both. This is indeed a consummation most devoutly to be wished; and in conclusion we would ask, on whom does its accomplishment depend? We have dwelt much upon the responsibilities which rest upon parents and instructers; but is there nothing for the pupil to do? Does all the kind and affectionate solicitude for his advancement in learning, manifested by his parents and instructers, lay him

under no obligation? Do they merit no return of gratitude? no correspondent exertion to improve, on his part? Can he witness the unremitting efforts that are daily made for his instructions, to teach him the extent, capacity, and proper use of his intellectual powers; to soften and refine his manners; to instil into his young and susceptible mind just and noble sentiments, elevated and honorable, and generous principles of action, and pure and irreproachable morality, and not feel his bosom expand with grateful emotions? Not so. We believe that a reflecting, ingenuous youth must be fully sensible that, in a very important sense, the completion of this great moral and literary enterprise depends upon himself; and that it is his duty, and ought to be his constant endeavor, to make the most acceptable return in his power for these services, by striving to profit by the instructions given him; by endeavoring to grow wiser and better each day of his life, and to prepare himself to act well his part when he comes upon the stage of life. When we can see instructers exerting this salutary influence upon their pupils, and witness such fruits of their labors; when we can see them thus communicating the electric spark of vital piety, intelligence, and virtue, to a circle of immortal beings of such unlimited extent, we shall hail the fact as the harbinger of a brighter day than ever yet has dawned upon the cause of education in our country, and throughout the world. Our hearts desire and most earnest prayer is, that we may witness its speedy and complete accomplishment.

HISTORY.

CHRONOLOGY OF THE PRINCIPAL events in the discovery and early settlement of America, and the History of the United States.

[Continued from page 224.]

1602 New England discovered by Bartholomew Gosnold, who built a fort on Elizabeth Island: he discovered and named Cape Cod and Martha's Vineyard.

1607 May 13, The first permanent settlement of Virginia made at Jamestown.

" Nov., Capt. Smith taken prisoner by the Indians, and is demned to suffer death, but saved by Pocahontas.

1608 Sept. 10, Capt. Smith is made President of the colony, and explores Chesapeake Bay.

" Canada settled by the French.

1609 The Indians lay a plot to destroy the colonists, who are informed of it by Pocahontas.

" Aug. 8, Hudson discovers the Delaware Bay.

" Sept. 12, He discovers Manhattan Island, and enters the river that bears his name, up which he is supposed to have proceeded as far as the present scite of Albany.

1610 The colony of Virginia suffer terribly by famine. Of nearly 500 persons who constituted the colony, only 60 remained at the end of six months.

" June 10, Lord Delaware arrives with supplies for the colony and 150 men.

" The Dutch form settlements on the Hudson.

1611 Lord Delaware departs for England, and soon after, May 10, Sir Thos. Dale arrives with three ships, 300 people, 12 cows and 20 goats, and other things, for the use of the colony.

1611 Aug., Sir Thos. Gates arrives with six ships, 280 men, 20 women, 100 cattle, 200 hogs, &c., &c., and assumes the command of the colony.
" Hudson's Bay discovered.
" Lake Champlain discovered by Champlain.
1614 First permanent settlement of the Dutch in New York.
1615 A fort built on the present scite of New York, near what is now Coenties Slip.
1616 Tobacco first cultivated in Virginia.
1619 The first legislature convened in Virginia.
1620 The first settlers of Massachusetts arrive.
" One hundred and fifty young women brought into the colony of Virginia from England, and sold to the planters for wives, at 150 pounds of tobacco each.
1621 The New Netherlands granted, by the States General of Holland, to the West India Company.
1622 A part of New Hampshire granted to Capt. John Mason and Sir Ferdinand Gorges, who, in
1623 Begun a settlement at Piscataqua.
" A fort built on the present scite of Albany.
1625 The province of Virginia made dependant on the crown of England.
1627 Delaware first settled by Swedes.
1628 Massachusetts granted to Sir Humphrey Powell.
" John Endicott arrives with a party of settlers.
" The Plymouth company erect trading houses in Maine.
1629 Boston founded.
" Wouter Van Twiller appointed Governor of New York.
1631 A town laid out near Wilmington, Delaware.
1632 The territory of Maryland granted to Lord Baltimore.
" Equal rights and privileges granted to all christians, by Maryland.
1633 Severe laws passed against dissenters, by the legislature of Virginia.
1634 The charter of the Plymouth Company resumed by the crown of England.
" The Dutch in New York encroach on Connecticut.

1634 First representatives chosen in Massachusetts.
1635 Rhode Island settled by Roger Williams, who is banished from Mass. as a heretic.
" Hartford, Con., settled by emigrants from Massachusetts.
" John Winthrop, son of the Governor of Massachusetts, arrived and took possession of the mouth of the Connecticut river, built a fort at Saybrook, and is appointed Governor of the colony.
1636 Massachusetts forms a treaty of peace with the Narragansett Indians, who at this time numbered 5,000 warriors.
1637 The three towns on Connecticut river, viz: Windsor, Hartford, and Weathersfield, determine on a war with the Pequod Indians, who were defeated, and forced to abandon their country.
1638 A settlement begun at New Haven, Connecticut.
" The first Legislature of Maryland meets at St. Mary's.
" Harvard College founded.
1641 New Hampshire taken under the jurisdiction of Mass.
" The Dutch lay claim to a part of Connecticut.
1642 The Colonists of New Haven establish a trading house on the Delaware, and begin a settlement there, but are expelled by Kieft, Governor of New Netherlands, (N. York.) The same Governor also expelled the colonists of Maryland from the Schuylkill river.
1643 The colonies of Massachusetts, Plymouth, Connecticut, and New Haven, enter into a confederacy, and assume the name and style of THE UNITED COLONIES OF NEW ENGLAND, May 19.
1644 Roger Williams obtains a patent from the king for Newport and Providence plantations.
1644 The general court (assembly) of Massachusetts first divided into two houses.
" April 18, A great massacre in Virginia by the Indians, who confederated to exterminate the whites—300 persons perished in this massacre.
1646 War between the Dutch settlers in New York and the Indians: a great battle fought between the belligerents.

1647 First general assembly of Rhode Island held.
" Peter Stuyvesant appointed Governor of the New Netherlands.
1650 First constitution of Maryland established, and the colony divided into counties.
" Settlements made in Carolina by Virginia emigrants.
" Virginia continues to acknowledge the authority of the crown of England, though royalty had been abolished by Parliament.
1652 Virginia submits to the government of the Protector, Cromwell.
" The province of Maine taken under the protection of Massachusetts.
" The government of Maryland taken out of the hands of Lord Baltimore, and settled in the hands of Parliament.
" The first mint in America established in Massachusetts.
1655 The Dutch, under Governor Stuyvesant, invade the Swedish settlements on the Delaware, and compel the Swedes to deliver up their forts. The officers and principal inhabitants were taken prisoners, and sent to Europe.
1656 The first Quakers arrived in Massachusetts, in July, and are banished from the province as heretics.
" An insurrection in Maryland, headed by Josias Ferdall, disturbed the peace and retarded the prosperity of the province.
1659 On the death of Oliver Cromwell, Virginia throws off the government of the protectorate, proclaims Charles II. king of England, Scotland, Ireland, and Virginia, before his restoration in England.
" Several Quakers executed by order of the general court of Massachusetts.
1660 Population of Virginia at this time about 30,000; of Maryland about 12,000, and of New England about 38,000 —total 80,000.
1661 Charles II. proclaimed King in Massachusetts.
" Penal laws against Quakers suspended in Massachusetts, on the mandamus of the king.
1662 The charter of Connecticut granted by Charles II.

1662 John Wintrhrop appointed Governor of the province.
1663 The territory lying between the 31st and 36th degrees of latitude, granted by Charles II. to the Earl of Clarendon, and erected into a province, under the name of CAROLINA.
1664 The territory now included in the boundaries of New York and New Jersey, granted by Charles II. to his brother, the Duke of York.
" The province of New Netherlands surrendered to the English by Governor Stuyvesant.
" New Jersey conveyed by the Duke of York to Berkley and Carteret.
" The English take possession of the Delaware.
" Charles II. grants New England to the Duke of York.
" The first general assembly of Rhode Island held.
" A treaty made with the Five Nations, by which these nations gave their land and submitted to the king.
1665 The city of New York incorporated.
" Connecticut and New Haven, heretofore independent communities, unite and form one province.
" The militia of Massachusetts consisted at this time of 400 foot and 400 horse: its commerce employed about 130 vessels, averaging about 50 tons each.
" The inhabitants of Maryland now amounted to about 16,000.
1666 Connecticut divided into the counties of Hartford, New Haven, New London, and Fairfield, in each of which counties courts are established.
1697 Governor Lovelace succeeds Governor Nichols in New York, and purchases Staten Island of the natives.
" New Jersey becomes a distinct province under Governor Carteret.
1670 South Carolina first settled.
1671 Slaves first introduced into Carolina.
" Their introduction encouraged in Maryland.
" Virginia at this time contained about 40,000 inhabitants: her militia amounted to about 8,000. Nearly eighty ships were annually freighted with tobacco by this province.

[To be continued.]

An account of the most important battles, sieges, &c., recorded in the ancient and modern History of Europe, and in which Europeans were engaged ; chronologically arranged.

[Continued from page 220.]

Siege and Capture of Carthage, A. D, 439, by Genseric, king of the Vandals.

On the capture of this celebrated city, 585 years after its destruction by the younger Scipio, Genseric founded a kingdom in Africa, known as the Vandal Kingdom, which existed about one hundred years.

Battle of Chalous, 451, between the Romans commanded by Actius, and the Huns under Attila.

Of all the barbarians who hastened the downfall of the Roman empire, the Huns were probably the most barbarous. They first made an irruption into Europe in 445, and soon ravaged a great part of southern Europe; and such were the cruelties committed by Attilia, that he was called "The scourge of God." His army consisted of 500,000 men, which was finally routed by Actius in this battle, with the loss of 160,000 men.

Sack of Rome, 455, by Genseric, king of the Vandals. Genseric having been solicited by the empress Eudoxia to aid her in the expulsion of one whom she had been found to espouse, and whose hand had been imbrued in the blood of her former husband, the emperor Valentinian took advantage of the anarchial state of Rome to make himself master of the city, which was given over to pillage. "The pillage lasted fourteen days and nights; and all that yet remained of public or private wealth, of sacred or profane treasure, was diligently transported to the vessels of Genseric." Among the spoils carried away were the holy instruments of the Jewish worship, the gold table and the gold candlestick with seven branches, originally framed according to the directions of God himself, and which were placed in the sanctuary of his temple. They had remained deposited in the temple of peace 400 years since the destruction of Jerusalem.

Battle of Caryford, 457, between the Britons under their king Vortimer, and the Saxons under Henghist.

The Picts and Scots having invaded Britain soon after the final departure of the Romans from the island, the Britons solicited the assistance of the Saxons. The latter, under Henghist and Honsa, having defeated the Picts and Scots, and finding a rich and fertile country, determined to appropriate it to themselves, and accordingly turned their arms against their former friends. Several battles were fought, in one of which Honsa was killed; at length in this battle Henghist defeated Vortimer, and founded the kingdom at Kent, which he enjoyed during his life.

Battle of Soissous, 486, between the French Gauls under Clovis, and the Romans under Siagrius.

In gaining this memorable battle, Clovis put an end to the Roman authority in Gaul, and on its ruins founded the kingdom of France, of which he became sovereign.

Battle near Paria, 490, between the Italians under Odoacer, and the Astrogoths commanded by Theodoric.

Odoacer, king of the Heruli, having put an end to the western empire by wresting the throne from Augustulus, was in turn attacked and defeated by Theodoric, who took possession of the kingdom, which for many years continued to be ruled by kings of the Gothic races.

Siege and Capture of Carthage, 534, by the eastern Romans commanded by Bellissarius, who thus put an end to the Vandal kingdom in Africa. The brave and noble Bellissarius was the ablest general of the age; besides capturing Carthage, he defeated the Persians in several sanguinary engagements, routed the Goths and Huns in Italy, took Rome and Ravenna, and by his fortitude and skill sustained the sinking empire, and for a time restored the glory of the Roman arms. These important services only excited the jealousy and envy of the weak and suspicious emperor, Justinian, who, instead of rewarding his services, recalled him, confiscated his estates, and suffered him to live and die in disgrace and poverty.

Battle of Xeres, 712, between the Goths of Spain, and the Moors or Saracens.

In this battle Roderick, the last king of the Goths, was defeated and slain, and his kingdom conquered by the Saracens.

Battle of Tours and Poictiers, 732, between the Saracens of Spain, commanded by Abderamus, and the French under the command of Charles Martel.

The Moors, or Saracens, having advanced to and plundered Bordeaux, penetrated into the interior of the country, which they threatened to subdue; they were, however, met and defeated by Charles, who obliged them to retire out of France.

Battle near Wilton, England, 872, between the Danes and the Saxons, the latter commanded by Alfred the Great.

England had been for more than a century at different times ravaged by the Danes, who were now every where victorious. Alfred being defeated in this and subsequent battles, was obliged to retire to a remote part of the island Athelmy, from which he afterwards issued, and attacking the Danes, who were wholly unprepared, defeated them in the

Battle of Edrington, and forced them either to retire from the country, or to submit peaceably to his government.

The battle of Hastings, 1066, between the Normans under William the Conquerer, and the English under their king, Harold.

This engagement was one of the most severely contested, as well as important in its result, recorded in the history of England: it commenced at sun rise, and lasted the whole day; but it decided the fate of the kingdom; Harold being killed, his army was finally routed by William, who immediately marched to London, and was crowned king of England.

[To be continued.]

FINE ARTS.

LECTURES

DELIVERED TO THE STUDENTS OF THE NATIONAL ACADEMY OF DESIGN,

ON HISTORICAL PAINTING.

By William Dunlap.

LECTURE III.

In my second lecture, when enumerating the acquirements which must be made by the historical painter to entitle him to the greatest degree of success, I mentioned the knowledge of Anatomy and Architecture; an acquaintance with the structure of man's body, and of the buildings he erects for shelter, safety, business or devotion. In both these branches of science, the lecturers who will follow me are qualified to give you invaluable instruction, but you must likewise seek it by diligent study of books, buildings, and the human frame. In my first lecture I have said that in the arts of design, men begin with those most necessary, they then seek the beautiful, and proceed to the superfluous and exaggerated. Architecture is an art of necessity, and has gone through all the stages I have enumerated,—from the cave, the tent, and the hut, to the massive structures of Hindoostan, Egypt, and Etruria, and the beautiful orders of Greece, the Doric, the Ionic, and Corinthian; and then to the superfluous Gothic and the fantastic and exaggerated combinations, which ignorance and bad taste have occasionally exhibited to be admired or ridiculed. A knowledge of drawing and perspective will enable the historical painter to copy the works of the Architect and the Sculptor, but he must not rest without an intimate knowledge of all the parts of the edifice and the statue. As he should be able to draw, in true propor-

tion the man and his various bones and muscles, so he should know how to plan the house or temple, and elevate it on his canvass with perfect accuracy. The Architecture of Egypt, Greece, and of Rome, must be familiar to the accomplished painter, and that of Hindoostan and even of China must be studied. The engraver will aid you in these studies; to him you are indebted for facilities unknown in remote times. Make diligent use of the advantages afforded you. The ancients possessed the art of engraving to a certain extent. They engraved on their monuments both letters and forms of men and animals. They engraved on precious stones for seals and ornaments of rings and other decorations. Why did they not go further? If they had possessed the inestimable art of multiplying the accurate copies of their noble architecture and sculpture, by taking impressions, from metal, stone, or wood, of their drawings, what treasures we should now possess in the representations of objects long since destroyed by inexorable time and the accursed ravages of ruthless war! However, let us, instead of vain lamentations, rather rejoice that those treasures we now possess, and those which are daily added by discoveries in science and the arts, are secured to posterity by the omnipotent operation of the press. In the various modes of engraving, the liberal professors of this Academy will afford you their instruction, and give you the history of the rise and progress of their invaluable art.

The science of perspective will be amply explained by the very able professor whose lectures will follow; but I cannot avoid touching lightly upon it in these discourses on Historical composition.

Perspective is of two kinds; linear, and ærial. The first is strictly scientific and depends upon known and fixed laws. The second partakes more of art than science, and is governed in its application to painting by the eye of the Artist. By linear perspective the painter determines the true situation and relative size of objects as he draws their outlines on his canvass; by ærial perspective their apparent distance from each other and from the spectator. He surrounds his figures with an atmosphere; they do not crowd upon or touch each other, although their contours come in contact. He produces that pleasing illusion, without which his outstretched cloth would ever remain a flat surface.

Let us for the last time recur to the transparent plane, or upright frame with its gauze. If held perpendicularly between the spectator and two balls of equal size, but at different distances from his eye, and if the outlines of these balls are traced upon the plane, the sizes of the circles which are given by these outlines will be different; one larger than the other. The picture consequently, though traced from the real objects, does not represent the truth. If both these circles are filled out with light and shadow and colour equally strong, the result will be a picture of two balls, one large and the other small. But here aerial perspective comes to the aid of the painter. He recollects that the greater the distance an object is placed from him, the greater is the volume of air which intervenes, and the more indistinct his vision becomes, and he traces the smaller circle more delicately, gives it fainter shadows, and makes the local colours more dim, by breaking or mixing them with blueish ærial tints. It is then no longer a smaller, but a more distant ball than that whose contour is formed by the larger circle.

Every picture, whether landscape or historical, must have its ground line, its horizontal line, and its points of sight and distance. The ground line is the base of the picture. The horizontal line intersects the picture, running parrallel to the ground line, at the real or supposed height of the eye of the spectator. The point of distance must be on this line, either within the bounds of the picture, or carried beyond the edge. The point of sight must be likewise on this line and always within the bounds of the picture. This last is likewise called the vanishing point, because, if the artist would represent, a row of pillars, of trees, or of houses, of equal height, receding from the eye of the spectator, he must draw a line from the top of the nearest pillar to this point, another to meet it from the base, and describe the row of objects within these two lines; it follows that the outlines of the objects become smaller and smaller, until they vanish in the horizontal line at the point of sight, or vanishing point; and if the linear is assisted by ærial perspective they will appear, on the flat surface of the canvass, so many pillars, or trees, or houses, of equal size, but vanishing from the eye in consequence of distance.

I have said that every object becomes fainter in colour as it re-

cedes from the eye. This being caused by the volume or quantity of air which intervenes between the spectator and the object; it follows that the greater the distance the greater the quantity. Shadow is made fainter by distance as well as colour, consequently distant objects, though in strong light, appear flat compared with those that are near. From these observations you will conclude that no pure local colour must be used upon a distant object, but, as well as *all deep shadows*, must be reserved for the foreground of the picture. Look at nature and you will see the same process in all her pictures.

Another branch of study for the historical painter is costume. By this word we mean such a representation of the personage introduced as a part of the picture as shall be conformable to truth. His clothing, decorations, arms, and ensigns of office or dignity, must strictly conform not only to the manners and customs of the nation he belongs to, and his rank in society, or official station, but to all these circumstances as they existed at the time of the action which is represented. You will perceive that the artist must not only he acquainted with the history of the transactions he elucidates, but with the antiquities of all nations, and their history from remote time, through the middle ages, to the present moment of his existence.

The historical painter must be familiar with the dresses of every degree or rank, among the civil, the military, or the sacerdotal establishments of every people and of every time. He ought as far as possible to be acquainted with the history of every character he introduces on his canvass. If his subject, for example, is the crucifixion, he must remember that it took place in the reign of Tiberius—in the neighborhood of Jerusalem—then occupied by Roman troops, and governed by a Roman proconsul. The Romans had subdued the world; but the arts, the literature, and the philosophy of the Greeks, had subdued the monsters of mankind. The Romans of the empire were therefore in costume and manners unlike the Romans of an earlier time, and the painter of this great event should not only represent the costume of Greece, Rome, and Judea, but of those countries at that period. Upon the Roman and the Israelite, and upon men of all countries, the in-

fluence of Greece had been shed by the character, the genius and wonderful actions of one man. Alexander the Great, in his triumphal progress of victories, had carried the civilization of Greece even to Persia and India, repulsed the tide of barbarism, and repaid Egypt the debt due her from the country of heroes and sages. Such events as those produced by the hero of Macedonia, are fit subjects for the historic painter, both in respect to their picturesque character and effect, and as they produced consequences of vast import to the world. Le Brun has accordingly chosen them and connected his name with that of the great conqueror, by successful and noble compositions, in which he has attended well to the subject we are treating of—costume. Thus we see how the costume of nations is changed by political events, or the progress of a successful leader, a Mahomet, or an Alexander, especially if their successors pursue the example of their chief, or secure the conquests he had achieved.

The propriety, not to say the necessity, of attending strictly to this branch of the art of historical painting, seems too obvious to need insisting on; and yet we know that many great painters have neglected propriety of costume, or purposely violated it. Among the modern painters, the masters of the French school have been studiously true to costume, as all know who have studied the works of Le Brun, Pouissin, Le Sueur, and David. The Italians, particularly the Venetian school, were faulty in the extreme, and the names of Titian, Tentoret, and Paul Veronese, or their great merits, cannot justify the ridiculous absurdities introduced by them into serious and religious compositions; where we see Jews in the dress of Venetian nobles, and the apostles in the costume of modern peasants. I recollect no painter but *Pouissin*, who has, in painting the last supper, represented the ancient mode or reposing, upon what may be called couches, during that repast; yet surely it is necessary to the scene. Every deviation from historical truth, or the manners, customs, and costume of the persons represented, lessens the value of the picture, misleads the uninstructed spectator, and is ridiculed by the well informed.

It is well to know that the color assigned to the robe of Nestor, is red; that kings are generally by the ancients represented in

purple; that conquerors on the sea, assumed, or were complimented, with robes or habits of green; hat priests were universally dressed in white, except the blue of the high priest of the Jews, to which was attached the golden pomegranates and bells, and whose breast-plate shone with precious stones of every color.

It is likewise necessary to be aware that, although black was, as now, the general color for mourning, both among Greeks and Romans; yet, that in the times of the emperors, females wore white as the mourning dress, while the men continued to cover themselves with black. In all this, and much more, you will be instructed by the professors of history, and by reading Winkleham and other authors. I will now touch on the last branch I have purposed to notice—choice of subject.

Subjects for the historical painter appear to be innumerable, and in the course of a long life of uninterrupted health he can execute but few. How important then is it for him to make a judicious choice! There are subjects that would be attractive to the artist if he only considered what would produce effect, or be picturesque. But there are higher considerations, or our art would not deserve the rank it holds. It has been the lot of genius to be employed in representing legends of superstition at the bidding of those who were interested in deluding the world; and much talent has been wasted in painting battles which had no influence on man but to increase his misery and cherish the worst feelings of his nature. Subjects are thought well chosen if they give an opportunity for the display of the artist's skill, or if they are popular, or for many other reasons of like import; but I hope, nay I know, that the historical painter is by his profession, placed above such considerations—although by circumstances often made to yield to them. The instruction of his fellow creatures, incitement to virtue, heroic acts, or philosophic suffering; to make men wiser and better is his business, and he is only then doing his duty, and justice to his profession, when he makes choice of such subjects as teach mankind truth; and such truths as make them better. It is his to show and impress upon the minds of men, those great actions of heroic sufferings, whether done or suffered by soldiers, sages, or saints, which in their consequences have effected the moral and

political state of nations or of the world. It is his to point out the way to gain immortality by being the benefactor of his species; and to prove, to the ignorant or thoughtless, that the Fine Arts are of more utility to man, as a being having mind, thought, soul, capability of unlimited improvement, and hope of immortal life, than all the grovelling, though necessary, arts which administer to bodily comfort. It is with this view that I proceed to consider the happiest and best choice of subjects for a painter, and to mention some of those admirable works of art, which, wanting this essential quality, are reduced in value or rendered worthless, except as examples of skill.

The acts of the Author of the Christian religion are all of the best class of subjects. They are familiar to all; of intense interest; and have had a most benign influence upon the world from the time of their performance to the present moment, and will never cease in their operation upon the human race. Many of the actions of the sages and patriots of antiquity are among the best subjects. The death of Socrates, a sacrifice to truth, or of Leonidas, a martyr to patriotism. If the painter wishes to represent battles, let him chose those which by their effects stopped the tide of barbarism or led the way to civilization—or such as overthrew despotism, and blessed nations with civil and religious liberty.

Our illustrious countryman, West, selected many of the finest subjects for the exercise of his energetic pencil. I will mention a few. The events flowing from or connected with the establishment of the Christian religion, as I have before observed, are all of this description. The Healing in the Temple, his magnificent present to the Pennsylvania Hospital, an act of the purest patriotism. His Christ Rejected, which you have lately seen and admired. His Death on the Pale Horse, which his oldest son may perhaps be induced to send over the Atlantic, in consequence of the tribute that has been paid to his father's merits by his countrymen. Of subjects merely historical I would remind you of his Battle of La Hogue. The trriumph of Rooke over James the Second, secured the revolution of 1688, and that liberty to the English nation which they have since enjoyed. Penn's Treaty with the Indians, is another of his happy subjects. Both as a painter and a patriot,

he deserves praise for the choice. I wish he had left us some of the actions of Columbus, among the monuments of his skill, that the deeds of the discoverer of our world, might have been celebrated by the pencil as well as by the pen of an American. I shall, before I close, mention another of his battle pieces, which represents an action in its consequences still more important than the victory of La Hogue.

A very great portion of the works of the best painters are faulty in the choice of subject. And nothing can tend more to lower our art in the estimation of the world. Of the three pictures which have been by many placed at the head of the list of historical compositions, two, at least, gain no additional value from the subjects treated. The Death of an Inquisitor, by Titian, and the Communion of St. Jerome, by Dommenichino, have no moral effect. The third, the Transfiguration, by Raphael, is happily without the defect we are treating of. It is much to be wished that the talent displayed in the two first mentioned, had illustrated some event connected with the high destinies of man, or conveying some instruction that would have been as acceptable to the mind as their skill and beauty is to the eye.

There are very many subjects from the history of the middle ages which may challenge a place among the best for the historical painter, and still more, although not of the first class, that have many claims upon his attention. Among the first, I will only now mention the patriotism of Arnold de Winklereid, who opened the way to victory for his compatriots, and gave the final blow to Austrian tyranny over the Swiss, by devoting himself to certain death. This was at the bettle of Sempach, in 1385. The Swiss yeomanry combatted for their liberty under every apparent disadvantage. Without defensive armor they had to contend with the invulnerable chivalry of a powerful empire. But their cause was just, they were determined to conquer or die—and they were victorious. At Sempach, the Austrian knights dismounted, and presenting an impregnable barrier of long lances against the Swiss, threatened them with destruction—themselves secured by armor of proof and the leveled line of spears, which defied the efforts of their enemies. Winkelried, recommending his wife and children

to his country, grasping as many Austrian spears as he could encompass, received them in his bosom, and opened a path for his brave countrymen to victory and liberty. I need not mention the truly holy alliance of Stanffacher, Furst, Melchthal, or the actions of William Tell.

These glorious struggles of the Swiss in the middle ages remind us of modern historical events, and of the triumphs of republicanism and virtue in our own free and happy land.

The battle of Breede's Hill is one of the highest class for the artist. It taught our yeomanry that disciplined troops would be defeated, and made the assurance of statesman doubly sure.

The patriotic painter sees the venerable Prescott on the summit of the hill, pointing to the discomfitted hirelings of Britain, who retire or fall before the steady aim of our militia. He sees the veteran Putnam striking up the muzzle of his neighbor's gun, aimed at the retiring officer who had in other times fought with him for the colonies, or shared with him the joys of social life. He sees on every side the present and future triumph of his country, and representing such a scene, teaches an invaluable lesson to all ages.

The battle of Trenton is worthy of the artist's pencil in every point of view, and has been worthily composed and painted by Mr. Trumbull. I will here mention another picture by the same artist, which I consider one of the finest produced during the last century. The sortie from Gibraltar. This is a well chosen subject for pictorial effect, but for nothing else. It represents an action without moral or political consequences. It is the triumph of our enemies over our allies. It is the triumph of foreigners over the native owners of the soil. It is the triumph of might over right. As a painting it deserves all praise

Another American distinguished as a painter, has left three or four (I recollect no others) historical compositions. Mr. Copley painted with great skill the fainting of Lord Chatham; the rescuing a youth from a shark; the death of Major Pierson, and the triumph of the English at Gibraltar. The first is a collection of portraits of distinguished men, either by chance or merit; the second and third have no merit in a historical or moral point of

view; and the last is liable to the same objections which have been made to a previously mentioned picture, without its merit as a painting. Mr. Copley's skill, care, accuracy, and great excellence as a painter, are well known to us all, and some of his pictures are extremely beautiful.

The paintings of David, are many of them of the highest class both in subject and composition. We have had one exhibited to us which has merits of the most extraordinary magnitude—the Coronation of Bonaparte. Many parts of this picture are of a perfection unrivalled by any thing we have seen, and the painter is not in fault that he did not choose a better subject; for he obeyed the order of his master; but *as a subject* for the historical painter, it has no worth, except that it preserves the portraits of men who are themselves the subjects of history and poetry, and of an event which marks the height from which intolerated ambition fell. It is an event in the history of a great captain, and if, as I believe, it was one of those acts which caused his downfall, it becomes a subject of still greater importance.

What a contrast is presented to a thinking man, between the degrading pageantry represented in the painting we are considering, and the noble simplicity of the inauguration of a Washington! And when we call to mind the consequences of each event, do we not distinctly see that the self-idolatry of one led to destruction, and the benevolent patriotism of the other to the happiness of millions!

I could with pleasure dwell much longer upon this portion of my allotted task, but I have already exceeded the limits prescribed to myself, and I will conclude by again mentioning West's Death of Wolfe.

This is not only one of the best historical compositions of a great master, but it is one of the best subjects for the historical painter, according to the principles I have laid down. It celebrates one of those events which have produced incalculable good to mankind. It stands conspicuous among those acts which have produced the greatest and most permanent effects upon the civilized world. It would not, perhaps, be too much to ascribe to the victory on the plains of Abraham, the blessings we enjoy under

our unparalleled constitution, and the recent overthrow of tyranny in France, the precursors to still wider spreading blessings to be obtained by victories over those institutions which have fettered the mind of man through all preceding ages. It may appear, at first sight, wild to attribute such mighty consequences to a battle gained in Canada, by a few English over a few French soldiers; but when we recollect that the power of France under a despotic government, had been exercised successfully to extend her armies and fortresses from the St. Lawrence to the Mississippi—that an enslaving and debasing government was extending an iron chain, made stronger day by day with systematic perseverance and admirable skill—of enclosing, as in a net of adamant, all the descendants of the English republicans, who had colonized the eastern portion of this country—by being drawn closer and closer, would have made of all this fair territory a province of despotic France, instead of what it now is—the freest and greatest republic the world ever saw. When we remember that all the struggles of the provincials, aided by the armies of England, had been for years rendered vain by the military skill and the power of France; when we call to mind the bloody and disastrous battles fought on the banks of Lake Champlain, and of Lake George—the defeat of Braddock, and the unceasing encroachments of the triumphant enemy—and remember that the victory of Wolfe, by breaking the *charm* and the *chain*, made of all North America a land of freedom—the land of Hancock and Henry, Adams and Franklin, of Jefferson and Washington—you will perhaps agree with me, that West, in choosing this subject, though he could not foresee all its consequences, chose one of the greatest known in the history of man.

I take my leave of you, young gentlemen, with sincere wishes for your success in your arduous pursuits. Your success will depend upon yourselves. Upon your industry, perseverance, and the exalted views of the profession you have chosen, together with the practice of those virtues which alone can make you happy.

USEFUL ARTS.

Improvement in Watches, being an account of a new Metalic Alloy for the pivot holes of watches. By Mr. J. Bennet.

In a machine so minute and complicated, and requiring such exactness of movement, as a watch, it is evident that whatever tends to increase or overcome the friction of the different parts, deserves careful and serious attention. At no part of a watch or clock is the quantity of friction of greater consequence than at the pivots, and the holes in which they work. The former are required to be smooth, properly proportioned, and also to be hard, to admit of being as slender as possible; and the latter should be made in such a material, as will generate the least possible friction, be hard enough to prevent the side pressure of the pivot from altering the shape of the holes, and be acted upon as little as possible by the acids, that the oil may be preserved in a pure state.

When watches were first invented, the holes in which the pivots worked were made of brass, and the plates were polished. It was found that the plates tarnished, from the action of the air, and rendered the general appearance of the watch very unsightly; and that the oil in the holes had a tendency to become impure from the action of *acids* on the brass. Gilding the plates was then resorted to, but with these disadvantages: it softens the plates, and consequently the holes; and the nitric acid, mercury, &c., used in gilding, has a very injurious effect on the pivots and oil. Both of these methods having their advantages and disadvantages, it is difficult to say which is the better of the two.

Ruby, or garnet holes, were then substituted for brass holes; and, by many, these have been considered the *ne plus ultra* of this part of watch making—a watch being considered valuable in proportion to the number of holes it has jewelled. But experience

proves, that when a hardened steel pivot works in a ruby, or garnet hole, the friction may, from a variety of circumstances, be materially increased, instead of diminished, by the hole. If it were possible, in *every case*, to have the two surfaces of the steel pivot and ruby hole perfectly smooth, the friction would be but trifling; but it is often very difficult to obtain this, even in the best jewelling. If there should be but the smallest imaginable part of the ruby hole unpolished, the action of that unpolished part on the pivot would be precisely the same as a common grindstone on a chisel or knife; consequently there would be two rough surfaces rubbing on each other, and thereby the friction would be very much increased; and ultimately the pivot, being the softer of the two, would be destroyed. The pivots which are nearest the maintaining power and the balance staff, especially if the balance be heavy, are most affected by bad jewelling, by reason of the greater side pressure they sustain. From this cause proceeds the harsh rubbing sound of the balance staff, observable in some jewelled watches. Hence many of the most eminent watch makers jewel only in the staff and scape wheel holes. Those who have been accustomed to repair watches with a number of holes jewelled, will have had abundant evidence of the truth of these observations. Mr. Bennet mentions two instances, out of a great number, which came under his observation, as, in them, the objection of bad jewelling, in the ordinary sense, could not be reasonably brought. He repaired, in November, 1829, a celebrated watch, given to H. Brougham, Esq. M. P. by the working watch makers of Liverpool, which is jewelled in every hole. As it is considered to be a specimen of the finest work the art of Liverpool could produce, it is fair to suppose that they would pay particular attention to the jewelling, which certainly is very valuable, both as regards the fineness of the stones, and the beauty of the workmanship. He found that every one of the pivots were cut and threaded by the jewelling, but more especially those nearest the maintaining power; and the polished surfaces of the pivots having been worn off by the roughness of the jewel holes, the dirt, &c., which the oil had collected, stained the pivots as black as ink. Now, a watch in this state is infinitely worse than one with com-

mon brass holes, as the only remedy is to have new pivots and holes, the expense of which would be almost equal to that of a new movement; not to mention the gradual increase of friction and consequent continual change in the rate of peformance of the watch. The other instance was a very superior carriage watch, by Tregent, made for the late Duke of Kent, and now in the possession of the Duke of Sussex, in which the staff pivots were nearly cut through by the jewel holes, it having a *very heavy balance.* This illustrates a foregoing observation that, in proportion as the side pressure the pivots sustain is greater, jewel holes tend, *above any other*, to increase the friction. A new staff was put to this watch, and the same process went on.

Watches have been made with steel holes, but these have never answered the purpose, for several reasons; principally on account of the constant liability to attraction between the pivot and hole, from magnetic influence, the friction caused by two metals of the same kind rubbing each other, and the disposition to oxidize.

Gold has also in some cases been used, but by reason of its softness it is objectionable both on account of the side pressure of the pivot, and the difficulty of getting a perfectly round hole.

What appears to be wanted to obviate the objections to which the holes above mentioned are liable, is to obtain a *metal* that shall preserve the oil in a pure fluid state, be subject as little as possible to friction, and be *softer* than the pivot, for it is of more consequence to preserve uninjured the pivot than the hole. Mr. Bennet tried various metals, both simple and compound, to procure one having these advantages.

Platina he found objectionable on three grounds, viz: difficulty of working; deteriorating effect upon the oil; and too soft to bear the side pressure of the pivots.

An alloy consisting of 3 dwt. of pure gold, 7 grains of silver, and 8 grains of steel, proved too brittle, and to possess a very coarse grain. Another alloy, prepared nearly similar to the foregoing, but having the addition of 3 dwt. 18 grains of platina, and 1 dwt. of copper, was found to have analogous properties. A compound of 1 dwt. pure gold, 1 dwt. copper, 1-2 dwt. silver,

and 6 grains zinc, proved very malleable, was nearly as hard as brass, and produced much less friction.

The following alloy, however, proved eminently successful, viz: 3 dwt. of pure gold, 1 dwt. 20 grains of silver, 3 dwt. 20 grains of copper, and 1 dwt. of palladium. The palladium readily united with the other metals, and the alloy fused at a temperature rather below that required for melting gold in a separate state. It was very nearly as hard as wrought iron, and not so brittle but that it could be drawn into wire. Its color was a reddish brown. Its grain on breaking as fine as steel. It takes a very beautiful polish; and the friction with steel was very much less than that of brass and steel, or the previously mentioned alloy with steel. It works well. Nitric acid has no sensible effect upon this alloy. Mr. Bennet has constructed a watch, and made the holes of this metal, and it answers fully his expectations, as regards its degree of hardness, its suffering the oil to remain in a pure fluid state, and its little susceptibility of friction. It produces much less friction than the jewel hole, especially supposing the jewel not to be perfectly well polished; besides that it will not *wear the pivot* nor be affected by the acid particles which may be contained in the oil. And with regard to expense, it has a decided advantage over the jewel hole,—as the expense of jewelling all the holes of a watch would be from 6*l.* to 9*l.*, whereas the same number of holes may be made of this metal for as many shillings.

[*Register of Arts.*

NATURAL PHILOSOPHY.

AURORA BOREALIS.

BY MR. KETCHUM.

As the wonderful phenomena called the Aurora Borealis, or Northern Lights, has been the cause of serious forebodings, fears, and much unhappiness in the human family, whoever can assign a rational cause for their appearance, and put it within the power of all to foretel that appearance, five hours before hand, will have aided the cause of science, assisted in tranquilising the minds of millions, and conduced to the happiness of mankind. It is a well established fact that their appearance thirty years ago gave much greater alarm than at the present time, owing probably to a less general belief in supernatural agency now than at that period. But even at this time, when they appear in their greatest splendor, many a stout heart palpitates, and many a mother clasps her infant more closely to her throbbing breast, while she laments the unhappy fate that is to consign thousands to the tomb, by means of the musket, sword, or tomahawk of the ruthless savage, in the bloody war, of which those lights are the never failing harbinger; in fact, some carry their ideas so far as to think they are the immediate precursor of the general judgment, and the first kindling of that fire that shall wrap the heavens together as a scroll. Hence the necessity of understanding their nature as far as possible, and of being assured of their harmless effects; and if I accomplish nothing more, I may elicit some thought, some *new idea*, that may give a direction or clue to some more able investigator of the subject.

I have thought it necessary to introduce a brief history of the winds, as they prevail on the globe, and some of the first principles

of electricity, as they are both intimately connected with this subject.

It is a general received opinion that the atmosphere that surrounds this earth is only set in motion by the operation of radiant heat; that when the rays of light, in passing through it, rarifies it, or makes it lighter, it then immediately ascends into a region of the same specific gravity with itself, and is there disposed of to supply any vacuum that may present the greatest attracting power.

The earth's diurnal motion causes the sun *apparently* to pass around the globe once in twenty four-hours, within the tropics, and near the centre of the earth; his direct and powerful rays, in those latitudes, heats the air intensely, and rarefies it, and as the apparent motion of the sun is from east to west, there is a constant ascension of warm air, and from what follows, a seeming disposition for it to follow the sun, for the vacuum formed by the ascension of such a large body of it, causes other more dense and cold air to constantly rush in, to fill such vacancy, which causes the trade winds.

These winds form a wide belt around the whole globe, (except a space of about two thousand miles in the China sea, Sunda Ioles, and the eastern part of the Indian ocean, where they blow six months east and six months west, and are called monsoons,) and then reach from the latitude of 30 south, to 30 north, and embrace all the intermediate space, following the apparent course of the sun; on the equater coming from due east, and merging gradually to southeast, and northeast as they approach the latitudes 30 south and 30 north. The variation of these almost universal winds is attributable to New Holland on the south, and Asia farther north, presenting a barrier to their course, and changing their direction. Farther south than the 30th degree of south latitude, the prevailing winds are from the west, and it is necessary this should be so, to supply the vacuum produced by the absence of that which supplies the trade winds; therefore in the southern hemisphere, which is not much intersected by land, and where the winds have a free course, the currents of air are quite regular, performing a kind of circuit constantly, of which the skilful navigator may avail himself to great advantage.

Not so in our northern hemisphere; the immense continent, caped with lofty mountains, obstruct those otherwise regular currents of air, and give them a direction quite foreign to their nature; and as our loftiest and largest ranges of mountains lie in a north and south direction, it so happens that the south and north winds blow many days in one direction, of which I shall have to speak hereafter.

Connected with this subject also, is the delicate science of electricity, as I have before observed.

The earth and all the bodies with which we are acquainted, are supposed to contain a certain quantity of an exceeding *elastic* and *subtle* fluid, which philosophers have united in terming the electric. The certain quantity belonging to all bodies may be called their *natural* share; and so long as each body contains neither more nor less than this quantity, it seems to lie wholly dormant, and produces no effect; but the moment the equilibrium is disturbed, and any *body* becomes possessed of more or less than its proper quantity, very remarkable effects arise from such unequal distribution, and such body is then said to be electrified, and is capable of exhibiting appearances which are styled electricity.

The great laws of the electric fluid, and those on which all the laws of electricity depend, are, that it is in a much higher degree elastic and repulsive in itself; that two bodies, having both of them either more or less than their natural share of it, repel each other; but if one of them has more and the other less than its share, they will attract each other. When one body possesses *more* than properly belongs to it, it is said to be *positively* electrified; but when it possesses less, it is said to be *negatively* electrified.

The equilibrium of this fluid is distributed by the *friction* of bodies against each other, and electricity is then said to be produced, or excited.

Hence, when one body, in a state of *positive* electricity, comes in contact, or nearly so, with a body in a *negative* state, a luminous spark is emitted, with a sharp snapping sound. This electric spark is supposed to be globular, but the rapidity with which it moves gives it an elongated appearance. When two bodies ap-

proach each other sufficiently near, one of which is electrified *positively*, and the other *negatively*, the superabundant electricity rushes violently from one to the other to restore the equilibrium between them. This effect takes place if the two bodies be connected by a conducting substance.

Whatever may be the *cause* that disturbs the equilibrium of the electric matter in the *atmosphere*, it may easily be conceived that when such disturbance happens, in the upper and highly rarefied regions of the air, the equilibrium will be restored by electric corruscations darting through the partial vacuum.

Having, as before observed, given an outline of the general course of the winds, and the first principles of electricity, I shall now attempt to give a brief history of the Aurora Borealis, or northern lights, describe their appearance in high latitudes, and if possible ascribe for them a probable cause.

This wonderful phenomena, whatever may have been said to the contrary, was known by the ancients, for we find some remarkable atmospheric phenomena mentioned by Aristotle and Seneca ; and Pliny speaks of a bloody appearance of the heavens, which seemed like a fire descending upon the earth, and at another time of a light seen in the night time equal to the brightness of day, which much terrified the people, &c., and the old English authors describe them as having been seen in 1560, 1564, 1574 ; and ever since that period they have been frequently noticed. The reason why they were not often mentioned by the Greeks and Romans probably is, that as they lived in low and mild latitudes, they were not frequently seen by them, for it is certain the higher the latitude the more frequent their occurrence, and it cannot *readily* be admitted, that a phenomena which has its foundation in the laws of nature, should have *recently* began to operate, and as the *cause* existed in ancient times, the *effect* must have been produced ; and rather than admit that they were less frequent *then*, I should incline to the belief that we may ascribe it to the lowness and mildness of the latitude ; and many records of their appearance may have been destroyed by the Goths and Vandals in the dark ages, when literature generally suffered so much.

The Aurora Borealis, called also northern lights, northern dawn,

streamers, the beam, merry dancers, &c., in high northern latitudes, as those of Sweden, Lapland, and Siberia, are singularly resplendant, and even terrific, and according to the testimony of some writers, eclipse the splendor of the stars, planets, and moon, and sometimes even the sun itself. In the northern districts of Siberia, according to G. Melin, "the Aurora is observed to begin with bright pillars which, rising in the north, gradually increasing, comprehend a large space in the heavens, rush about from place to place with incredible velocity, and finally cover almost the whole sky up to the zenith, and produce an appearance as if a vast tent of gold, rubies, and sapphire, was expanded in the heavens. A more beautiful spectacle cannot be painted, and who could see such an appearance for the first time and not be lost in wonder, astonishment, and terror?" And the same author further observes that however fine the illumination may be, it is attended with such a hissing, cracking, and rushing noise through the air, as if the largest fire works had been playing off. To describe what they then hear, the Siberians make use of the expression spolochi chodjat, *that* is, the raging host is passing. The hunters who pursue the white and blue foxes in the confines of the icy sea, are often overtaken in their course by these lights. Their dogs are then so much terrified that they will not move, but lie obstinately on the snow till the noise has passed. He further says, "I have heard these accounts from some who have spent many years in these high northern regions, and on whose statements I can implicitly rely."

I will now attempt to assign a probable cause for the appearance of the Aurora: the effect we frequently see, and if the mind can settle down in a belief that it understands the *cause*, the *effect* will cease to produce alarm or terror.

I have been a very close observer of these lights for many years, and have never known them in one instance, as I recollect, to follow a southerly wind, which invariably brings a warm, humid, or damp atmosphere; but they are always preceded by a wind to the north of either east or west, which brings with it a dry, arid, and elastic one—not that a northerly wind *always* produces them, but *generally* does, for even a north wind *sometimes* is attended with

such circumstances as may prevent their appearance. For instance, the north wind may blow fresh and be highly suited to produce the common effect, but if the circumambient air, in one neighborhood, to the north of us, is already extremely arid and elastic, no light will be seen, as will more fully be shown hereafter.

I have observed that the south wind is a very prevalent one in our latitude, and it is certain that, as it has recently arrived from the neighborhood of the ocean, it is damp and humid, and is possessed of little or no electricity, or in a negative electric state. It frequently blows with force two or three days, forcing and compressing (for atmospheric air may be compressed into a much smaller space than it naturally occupies,) a large quantity of air into the high, cold, polar regions, where the surface of both earth and water is covered with eternal snow and frost. It then becomes intensely chilled, dry, and elastic, and of course highly charged with the electric fluid. The south wind having spent itself, a reaction immediately takes place, and the *positively electrified* air returns in the shape of a north wind.

Now it must appear evident to all, that there must be some region where this north wind is constantly meeting a column or strata of air, less arid and elastic than itself, hence less electrified; and as the north wind is in a state of *positive* electricity, and the region that it constantly meets is in a *negative* state, the electric fluid will be constantly passing from the *positive* to the *negative* air, to restore the equilibrium. Hence the rushing sounds heard by the Siberians, and the belief of many in our country that they have heard a sharp rushing sound when the Borealis was very brilliant.

The brilliancy of the light, the rapidity of its movements, and the instantaneous changes of form which it always undergoes, seem strongly to prove that electricity is the powerful agent through which those lights are produced. I at first thought that the attributing the Borealis to electricity was original with *me*, but I have found on examining authors on the subject that I was mistaken. Others have preceded me in the idea, and have stated that the passing of the electric fluid from *positive* to *negative* air, produced the light; but their attendance upon any particular *current of air*

has not been mentioned; and I think *that* is important, as the experienced observer can thereby generally *predict* their appearance, and when he can *foretel* their coming, he must feel confident he understands their cause.

To show more clearly that the Aurora Borealis is the effect of electricity, I will relate a few experiments which have been made to test it. If a glass tube, resembling a Florence flask in size and shape, be exhausted of air, by means of a syringe fixed to its mouth, and then be excited by friction, it will appear filled with a pale light, resembling the Borealis, which will go and come at intervals, sending forth brilliant flashes, exactly as this meteor does in the heavens. If either end of the flask be presented to the conductor of an electrical machine, and the other held in the hand, a constant stream of pale light will be transmitted through it, proceeding from the conductor.

Mr. Canton also contrived to imitate the Aurora Borealis, by means of electricity transmitted through the Torricellian vacuum, formed in a glass tube, three feet in length, and hermetically sealed. When one end of the tube is held in the hand, and the other applied to the conductor of an electrical machine, the whole tube is illuminated from end to end, and will continue luminous for a considerable time after it has been removed from the conductor. If after this it be excited by being drawn through the hand either way, the light will be uncommonly intense, extending without the least interruption from one hand to the other, even throughout its whole length. Nevertheless the tube will flash at intervals, if held at one extremity and kept quite still, but if it be grasped by the other hand at the same time in a different place, strong flashes of light will hardly ever fail to dart from one end to the other, which will continue twenty-four hours and longer, without any fresh excitation. An arched double barometer, of a considerable height, exhibits these phenomena in a still more striking manner.

Thus we find that a small quantity of electricity excited in a highly rarefied atmosphere, or in a medium approaching to a perfect vacuum, will exhibit luminous appearances, entirely resembling the Aurora Borealis, with electric light and it may be mentioned as collateral proof of such identity, that the atmosphere is

found by the electrometer, to abound with electricity, when the Aurora Borealis shines forth, and that the magnetic needle is evidently disturbed by it, as well as by the action of an electric machine, or by the natural electricity of a thunder storm. But what seemed the greatest objection to the above arguments, and caused some writers to almost *doubt* their own conclusions, *was*, that these phenomena should almost be circumscribed to the polar latitudes, and the more elevated regions of atmosphere; for they thought they ought to be as frequent in tropical as polar regions. Now, I conceive my theory removes these objections—for, if the Aurora be dependant on a highly rarefied and excited air to produce it, then the north wind furnishes that supply, and the nearer the poles the higher the excitement, and the more elastic and arid the air; and it necessarily, as it travels south, and is constantly meeting negative air, discharges its superabundant electricity; so that when it reaches the tropic, its electricity is merged in the surrounding atmosphere.

In my observation of these phenomena while in a residence of nearly three years in the latitude of 47 south, I hardly ever saw the Aurora Borealis towards the south pole; and the cause I assign for its unfrequency there, is that I was surrounded by water for a great distance, and as the humidity arising from the water is calculated to dispossess the air of its electricity, of course it spent its force before coming within my vision: and probably the same cause prevents its ever being seen in low latitudes at sea. I believe that it cannot be as frequent in the same parallel of latitude between America and Europe as on either of those continents. I must further observe, and it corresponds with my theory, that as the Aurora Borealis is accompanied, or preceded by a northerly wind, that the longer and fresher the wind blows, the more elevated from the poles will the light appear.

I observed one attentively, I think in September, 1827. The first day it blew fresh from the north, and the evening was clear, and the light appeared in the north, in the form of an arc, or part of a circle, its highest point elevated about twelve degrees above the horizon, and from the upper edge radiated numerous corruscations, or streamers, as usual, while the lower edge, where the air

had become neutralized, and the equillibrium restored, appeared distinct, and the sky a very dark blue, which I conceived the effects of contrast—there being of course much *light* in its immediate neighborhood. The wind blew fresh from the north all the next day, and a clear evening followed; the same arc presented itself, elevated perhaps thirty degrees from the horizon, with the same well defined lower edge, and on its upper, the accompanying emanations of light as usual, while some of the longest streamers extended almost to the zenith. On the third and last day of their appearance, the wind blew fresh from the same quarter, with a still clear night, and the arc then appeared in the form of a beautiful luminous bow, over head, with one foot resting in the east, and the other in the west, and that which before had seemed its upper edge, was now its southern one, as its position was changed, and from that side and through its centre, I could perceive multitudes of beautiful corruscations. For several hours it moved gradually to the south, from which I concluded it was a continuation of the same arc which I had seen three nights previous, and which had been regularly progressing southerly.

I will now suppose that at that point where I first saw it, and where the equalization of the electric fluid was taking place, was the latitude of 60, and that it reached latitude 45 in 48 hours, (the difference of time between seeing the first and last appearance,) having about 1000 miles for it to move, or twenty-one miles an hour, and twenty miles an hour is the rate that a pretty brisk gale is allowed to advance. I will mention but one exhibition more of this phenomena, and this is the one which appeared in April last. It was seen in great brilliancy at Troy, (N. Y.) The wind blew from the north, and the splendid illuminated corruscating arches which covered the north, gradually moved south, until they passed the zenith, and then the corruscations shot in arches from east to west, south of the zenith. No noise was heard.

From the preceding remarks I come to the following conclusions.

First. That the Northern lights are luminous sparks, emitted from atmospheric air, highly charged with electricity into air of a less excited or *negative* electric state.

Secondly. That as air generally moves in columns when it meets with no obstruction, *that region* where that equalization of electricity takes place must constantly form an arc or bend in the heavens, and its height or apparent elevation, will depend on its nearness to the observer.

Thirdly. That the corruscations of light always appearing *above* or *south* of the arc, is in consequence of such equalization, *preceding* the arc, as the fitful gusts of wind drive onwards.

Fourthly. No corruscations can appear below or behind the arc, as the air has then already been neutralized, and the sky below appearing darker, is the effect of contrast.

Fifthly. That as they are dependent on highly rarefied air for production, no wind but a northerly one can produce them, and *that* almost invariably does.

Sixthly. That on the ocean, and near the tropics, the humidity and dampness of the air arising from the water, destroys the necessary electricity calculated to produce them. And

Finally, That before the positive electrified air can reach the low latitudes, it will have spent itself in the surrounding *negatively* electrified air, which is the reason the nearer you approach the poles the more frequent and brilliant they are.

Permit me to add, that the last night of their appearance is almost always followed by a south wind, warm weather, and generally rain.

SCHOOLS, SOCIETIES, &c.

AMERICAN LYCEUM.

Pursuant to the recommendation of the New York State Lyceum, a convention of delegates from different and distant parts of our country was held in this city on the 4th inst. to form a National, or American Lyceum, which has accordingly been organized. This association is designed as a centre or rallying point for State Lyceums, and to exercise a controlling influence on them.

The utility of Lyceums in general, and their objects, may not be fully understood; and we will, therefore, endeavor to explain them. Lyceums may be defined to be "*A Voluntary associations for mutual improvement;*" and comprise such objects as the following, namely:

1. Familiar *lectures*, discussions, and various exercises for mutual improvement. 2. *Collections* of minerals, plants, &c. 3. Procuring *apparatus* for illustrations in the sciences. 4. Collecting *libraries*. 5. Improvement of *teachers*. 6. Providing more effectual instruction for the higher classes of common schools.

The *utility* of these associations was argued from their tendency to supply profitable topics for conversation among their members—from their affording the most rational amusements—from their awakening an interest among parents and others in behalf of common schools—raising the qualifications of teachers—encouraging geological surveys, and accumulating materials for town and county maps; and, in general, from their tendency to enlighten and regulate public sentiment in regard to the important subjects of popular education.

From information elicited during the discussion of the several subjects which came before the Convention, it appears that the establishment of Lyceums in Massachusetts, and other Eastern States, has already been productive of most extensive benefits. As soon as the nature and objects of these useful associations are fairly understood, they are numerously attended; and the spirit of improvement which they excite,—the taste for science,—the love of useful reading,—the efforts at composition, and the general inclination to cultivate the higher and nobler faculties of the mind, have been very conspicuous.

MISCELLANY.

ON THE TREATMENT OF WOUNDS.

An Essay read before the Holliston Lyceum, written by Dr. Dickinson, late of Waterford, New-York.

There was a time when the generality of mankind were unaccustomed to *think* and *reason* upon the every-day occurrences of life; and took every subject upon authority. It was quite enough to do as father *said*, and grandfather and grandmother *did*, before them. Few ever asked the *reason why*—all were content to hear *authority* say, *it is so*. But those days have now passed away. Men now *will* think; they *do* think. As a proof of it, look at the *libraries*, *debating societies*, *lyceums*, &c., located all over our country, in which all the *common occurrences* of *life*, and *common principles* of *action*, are examined; their *reasonableness* and *propriety* investigated and explained.

I shall this evening present some subjects of *common life* for *you* to *think* upon; subjects which interest every one of you, but which only a very few of you ever thought upon at all, and still fewer ever thought correctly.

I allude to the application of remedies to all sores, wounds, bruises, sprains, &c., to which we are all every day exposed. And I will begin with *simple applications*, by which I mean all ordinary dressings to what are called open-sores, and to cut-wounds.

And here let it be distinctly understood, that all and every article used for these purposes, as a remedy, is perfectly *passive* and *inert*, as to any power over the operations of the animal system. And such things as healing salves, healing washes, &c., have no existence in nature. The property and power of healing resides entirely in the individual, living, human being, and not in the applications made to the wound. If the salve had the power of

healing, it would heal a wound in a dead man, or an auger-hole in a board! As absurd as this conclusion may appear, it is nevertheless true. We cannot avoid such a conclusion. Fire has the power of burning, will burn dead matter as quick as living; and if salves, and the many other dressings to sores, were healing, they would operate likewise on dead matter. But we know they will not. You will ask then, why any thing of the kind is employed? Why use them, if they cannot heal? I will endeavor to answer you.

There is a universal principle of preservation in every living thing, whether vegetable or animal; a power to protect and preserve itself, and to repair any breach or wound which may at any time happen. You have seen this in your garden, by noticing how quick new bark will form over a wound, which a knife or hoe has made upon your fruit tree. You may be convinced of the existence of this principle of preservation, likewise, reflecting that without such a principle we should carry about with us, at this time, every wound, cut, and sore, we ever had upon our limbs and bodies since infancy.

You will ask again if sores will always get well themselves, why do any thing?

We live in a material world—surrounded on all sides by substances crowding and pressing upon us—and although, as we have seen, kind nature is faithfully at work healing up any wound which may exist, yet she is liable, every moment, to be perplexed and retarded in her operation, by the irritating effects of the many material substances which surround us. The air, moisture, dust, rubbing of our clothes, and a great many other things, will be constantly interfering with kind nature, stopping her work, and of course rendering the healing process very slow. Now if we wish the sore to get well quick, we must do something which will do no hurt itself, and prevent every thing else from hurting. Now a clean cloth or bandage will do all this, with one exception; it would stick tight to the wound, and do damage when it was removed. This clean cloth, therefore, should have upon it, before it is applied, some simple oily substance, to prevent it from sticking. And now every thing which physician, surgeon, or nurse, is ever called upon

to do, is done ; i. e., we have a simple dressing which, as a sentinel, keeps off every thing which would hurt, and which allows nature to do her own work in her own way. And all the thousand and one applications made to wounds, which do more or less than this, do injury, and should be discarded.

In many cut-wounds, indeed, there is a strong tendency to gape open ; hence the application must not only be a sentinel to keep off injury, but must have the power of keeping the parts in their proper places. This may be done by the simple adhesive plaster.

I will now speak of cold applications. This is a class of very great importance, one which has been too long in disrepute, and too little used in our attempts to alleviate human sufferings. Cold applications are required in all high feverish heat, in all bruises, sprains, and inflammations, in all violent head aches, sore eyes, wasp stings, &c., &c.

Now let us look at the *reason* for applying cold. It is in all cases to *prevent too much inflammation.* It is one law of our nature that an unusual quantity of blood immediately rushes to any part inflamed. As proof, think how quick the eyelids will swell when struck, or the arm swell when stung by a wasp. Now this swelling is nothing more than the flesh being crowded too full with blood. Again : it is another law of our nature that less blood goes to any part that is cold, and more to any part that is warm. As proof, in winter we come into the house with hands, face, ears, &c., white with cold ; but we find the good woman sitting by the fire red with heat.

By this course of reasoning, then, you see why cold is applied ; and you may also learn all the causes in which it is required, viz : in all cases where you wish to prevent inflammation and swelling, or where swelling has taken place, and you wish to remove it. And you may learn, likewise, how effectually this may be done, by remembering that if you remain out in a cold evening long enough, that is, apply cold enough to your ear to freeze it, you have driven every particle of blood from it, and it is as white as a lily. In all common cases, much less cold than that will answer our purposes. The effect will always be the same, differing only in degree ; cold will always keep the blood from rushing to the part ;

that is, will always prevent inflammation and swelling, and that was what we were called upon to do.

Having proved, then, that cold applications are necessary and useful, the next question will be, how will this application be made? What article shall be used?

I will say that there are many articles, and many ways of accomplishing this object; but the cheapest, the most convenient, the neatest, and altogether the best mode of applying cold, is by means of cold water, snow, or ice.

The *prejudices* against *simple cold water*, I know to be very great in the community; but I also know that these prejudices are hereditary, believed because grandfathers and grandmothers said so, without one reason from the nature of things, or one single fact from experience. We know such prejudices do exist, from the fact that cold water is never recommended as an application to an inflamed limb, sprained ankle, or sore eyes; but we hear from one the question, 'What, *clear* cold water? May I not put some rum, or some vinegar to it?' Another will ask if it would not be well to put in some salt, or soap; and if it is to wash inflamed eyes, all will cry out, 'Put some milk with the water.'

We have explained before why we use cold water, or any thing else in any of these cases. It is simply to obtain the principle of cold. Now, do any of the articles recommended by those prejudiced, make the water any better? that is, colder? Oh no, that is not expected; 'We would mix these articles with the water,' say they, 'to keep the patient from taking cold!' But look at this one moment. Can it be supposed that a little salt, or vinegar, or rum, applied to the skin, will keep a person from taking cold? Are there any facts to prove such an assertion? Oh no; this is an idea which has been handed down from father to son, ever since the first Indian doctor began to practice with his mysterious roots; and no reason can be assigned for it. As well might we say that the pebble stones in the bottom of the brook keep the horses from taking cold when we drive them in to drink.

I have known a swelling upon a child's forehead, as big as a pigeon's egg, occasioned by a fall; and because there happened to be no camphor in the bottle—the sympathising mother had

nothing to do but sit down and cry over her child. Now she should know that cloths dipped in cold water, or, if in winter, when it can be obtained, a snow ball, wrapped up in a cloth, and held upon the swelling, will do more good than a gallon of camphor.

I have known persons heat rum to wash the head with, in violent head-aches; when showering it with cold water, or a cap of snow, will do a great deal of good, as we might expect.

I have known a good nurse put on bruised wormwood, steeped in boiling vinegar, to a sprained ankle, to keep the swelling down; but, according to the laws of our nature, all hot applications, in such cases, do hurt. We must apply cold, to do any good. Let pitchers full of cold water be poured from a height upon such an ankle, and the inflammation will be very soon subdued.

Hot applications are also necessary in their place, and we are daily called upon to use them. The effects of heat, when applied to the skin, is directly the reverse of the effect of cold; that is, heat will always increase the inflammation and action of the part to which it is applied—warm baths, steam baths, &c. come under this class; but I shall say nothing of them, and confine my attention entirely to the nature and application of poultices, which are useful in all abscesses, whitlows, biles, &c. Now, why are hot poultices used in these cases? Let us look at the true reasons. In all these cases there is a formation and collection of matter under the skin and flesh, which must work its way to the surface. And, according to the law of our nature, the warmer we keep the part—the quicker the work will be done. That is one reason. Again, the skin is hard and unyielding, and the swelling great; of course, the skin will be stretched very much, and the pain be severe; now a hot poultice will macerate, soften, and, as it is called, par-boil the skin, and allow it to be stretched and extended by the swelling, with less pain, and also allow an easier passage for the matter. And this is the other reason for using hot poultices. Now, in accordance with these reasons, the poultice must be made with something soft, moist, and warm; these three are all the requisites. And a cloth wrung out of hot water possesses all these, and is a poultice to all intents and purposes; but such a poultice will very soon become dry and cool, and would require

to be changed too frequently. I would therefore recommend a slice of common white bread, moistened with hot water. This is a preparation which possesses all the three requisites of soft, moist, and warm; it is a perfect poultice, performing every duty which a poultice can perform; and is the only one which ever need to be made. When it has been on so long as to lose the three requisite qualities, and becomes hard, dry, and cold, it should of course be replaced by another.

The notion that different kinds of sores, or sores situated in different parts of the body require different kinds of poultices, is entirely an erroneous notion. The effects to be produced, as we have seen, are always the same, and of course, we always want the same cause.

Again the attempt to make a poultice better by adding to it seeds, leaves, herbs, roots, juices, &c., is a perfectly vain attempt. They can never do any good, and many do much hurt. Again; there do not exist in the animal, vegetable, or mineral kingdom, any articles which can make a drawing, rotting, or healing poultice. Such things do not exist in nature: and the use of all the expensive, far-fetched, loathsome, and disgusting articles we so often meet with, should be discarded as a practice belonging entirely to the dark ages, unworthy of the notice, and dishonourable to the character, of the present enlightened age.

NERVOUS DISORDERS.

[From the Journal of Health.]

It is remarked by the good and wise Fenelon, that the ignorance of the generality of young women is a fruitful, if not the chief, cause of their being troubled with nervous disorders, and of their not knowing how to employ themselves innocently. When they are brought up without solid information they cannot be expected to have any inclination or taste for study, or for rational amusements. Every thing sĕrious appears dull—every thing that requires attention or exertion fatigues them. The thirst after pleas-

ure, so natural to youth, and the example of persons of their own age who are plunged in dissipation, or occupy their waking hours in languid indolence or frivolous amusements, contribute to make them dread a quiet domestic life. In early youth their want of experience renders them unfit to superintend the concerns of a family, and they are not even aware of the necessity of acquiring this kind of knowledge, excepting in those instances where their attention has been particularly directed to it by the good sense of a mother. Among the opulent classes, young women are not necessitated to devote any portion of their time to needle work, and from the few hours they spend at their needle, merely because they are told, without knowing why, that it is not right for females to be ignorant of this species of work, they derive more harm than good. The occupation is very often for mere show, and they seldom apply to it with eitheir pleasure or diligence, but merely to pass away that time which, for want of rational means of enjoyment, would otherwise lay heavy on their hands; while, from the constrained and often awkward posture of the body which it demands, it acts prejudicially upon their health—often already undermined by their listless and inactive lives. If the piano or harp be substituted for the needle, but little advantage is derived. What then is to be done? For want of solid information their time must be occupied with trifles: for want of rational and healthful employment a young woman becomes indolent, nervous, and low spirited: she accustoms herself to sleep longer than is necessary to health; and this long sleep weakens her and renders her subject to frequent attacks of indisposition—whereas, by moderate sleep and regular exercise, both of body and mind, she would become lively, strong and active, cheerful and contented—qualities highly beneficial to health, not to mention the mental advantages they procure. The indolent indulgence, too common with young females, joined to the want of solid information, produces also a pernicious taste for shows and public amusements, and a frivolous desire for novel excitements, alike dangerous to their health and innocence. Well informed women, occupied by serious duties, or seeking relaxation from those in cheerful but rational amusements, generally possess but a moderate degree of curiosity, or one directed by a sound discre-

tion. To their well governed minds the insignificance and folly of most of those pursuits, for which little minds that know nothing, and have no occupation of their own, are so eager, present no attraction. On the contrary, young women who are ignorant and thoughtless, always possess a disordered imagination. For want of solid food their curiosity is directed to vain and dangerous objects—by its indulgence their health is injured, and their peace and happiness destroyed.

Perseverance. Perseverance generally wins the prize, while despondence always loses it. Without perseverance, Columbus would never have gained the immortal fame of discovering a new continent.

Happiness. Happiness does not so much depend upon our circumstances, as the agreement between them and our dispositions.

Gravity. Gravity belongs more to the *ass*, than the horse; it oftener conceals ignorance than indicates knowledge.

Imprudence. Misfortune is generally but another name for imprudence.

Fondness. A wife who is *fond* in the parlour, is generally *furious* in the kitchen and bed-room.

NEW PUBLICATIONS, &c.

NEW PUBLICATIONS.

Several new works have issued from the press in this city since our last notice of them, with a few of which we have been favored by the publishers. Among these are, AINSWORTH'S ENGLISH AND LATIN DICTIONARY, *first American edition, with corrections and improvements, by Charles Anthon, Professor, &c.; published by* HENRY C. SLEIGHT, *Clinton Hall.* The publisher of this work has really done the public an essential service; to say nothing of the corrections and improvements by Professor Anthon, than whom no one is more competent to the task here undertaken, the price of the book is reduced full one half from that of the old English edition; the size (12 mo.) is much more convenient, and it is executed in a neat and very superior style—we have no doubt it will entirely exclude the old edition from our classical schools, and very handsomely remunerate the enterprizing publisher.

The 17th, 18th, and 19th numbers of HARPERS' FAMILY LIBRARY: being Cunningham's Lives of Painters and Sculptors.

We have before expressed our opinion of "*The Family Library*," and we now take occasion again to say, that we think the series of books which the Messrs. Harpers' are publishing under that title, as far as we have had an opportunity of judging, entitled to the extensive patronage they have received from the public. The subjects selected, are, generally speaking, both useful and interesting in themselves, and are treated in a popular and agreeable manner: the style is clear, easy, and flowing, adapted to the taste of general readers, for whom the books are designed. The writers are mostly men of high rank in the literary world, and appear to possess the happy talent of blending instruction with amusement. Notwithstanding, therefore, the condemna-

tions which "The Family Library" has received from some of our literary brethren, we hesitate not to commend it to the public as a valuable series of works, and worthy a place in every gentleman's library.

The present numbers we consider as decidedly the best which have yet bet been issued; they will be read with great interest, and cannot fail to increase the popularity of these already highly popular books.

There is one effect which we believe the Family Library has been influential in producing in the community, which is of itself the highest possible recommendation of it, namely: to diminish the reading of novels; we attribute this effect to the LIBRARY, because we believe that since its commencement, the publication and sale of fictitious works has been materially lessened in this country. We have no objection to a *good* novel, but that the indiscriminate reading of them, to the extent that has been practised in this country for some years past, may give place to reading of a more *useful* kind, is "a consummation devoutly to be wished," no one will deny—they have had their day, but the intelligence of the public now calls for something of a more substantial kind.

History of Banking Institutions in England and America. By Thos. H. Goddard; published by H. C. Sleight. This is a valuable book; it is rather a compilation, to be sure, but it contains much information, not only in regard to the general principles of banking, but in regard to the statistics of the banks in the United States.

The history and the great principles of banking should be better understood by the community in general, and by merchants in particular; were this the case, we might be saved from a great deal of banking quackery to which we are now obliged to submit, and which, not unfrequently (though not so often as formerly) results in serious losses to the public. This work throws much light on the subject of which it treats.

The Analytical Reader—Introduction and Sequel: by Samuel Putnam. These books, designed for the use of schools, deserve much commendation. The introductory selections, for the

use of children in the first rudiments of reading, are characterised by great simplicity, and a chastity of style and sentiment highly creditable to the compiler's taste and judgment. The interesting little stories with which the work abounds, are most happily selected, and exhibit on the part of the author an intimate knowledge of the constitution of the juvenile mind. These stories will be found not only to improve children rapidly in the art of reading, but to exert a salutary influence in the formation of their moral character. Mr. Putnam has shown much judgment in selecting such pieces only as children will be likely to understand; and in order that they may thoroughly understand what they read, the most difficult words are selected and placed upon the opposite page, and their definition, or rather their various definitions, given. He holds it as a truth that no person, whether a child or an adult, can read with proper tone, emphasis, and modulation, that which they do not understand; this is strictly true, and it is from the fact that children have from time immemorial been required to read language entirely incomprehensible to them, that there are so few persons in the community who can be termed *good* or even *tolerable* readers. We have had the pleasure of attending an examination of the school under our author's charge, and can bear testimony to the great proficiency made by his pupils; they certainly read with greater correctness of modulation, and propriety of tone, than any boys we ever heard of the same age.

The Visible Numerator. An apparatus bearing this title, and designed to illustrate to the *eye*, and thus convey to the *mind*, a clear and adequate idea of the principles of Arithmetic, has been invented by Mr. Oliver A. Shaw, of Richmond, Va., who is now exhibiting it in this city. It consists of a series of solids designed to represent the value of figures in different places in regard to each other—as units, tens, hundreds, and so on. The block or solid representing tens, being ten times as large as that representunits, and that representing hundreds, ten times the size of tens, and so on, shows to the boy at one *view* the different value of figures in different places,—a thing, by the way, extremely difficult for them to understand in the ordinary mode of teaching. The apparatus is very simple, and we cannot but look upon it as one of the improvements of the age.

LECTURES ON HISTORICAL PAINTING.

We cannot refrain from paying a passing tribute to the lectures on Historical Painting, by Mr. Dunlap, the third and last of which will be found in this number. Mr. Dunlap is not only an artist, but a zealous promoter of the arts, and as one of the founders and main pillars of the Academy of Design, has rendered invaluable services to the profession of which he is a distinguished member. Nor has his labors been confined entirely to the profession he has chosen, but like Sir Joshua Reynolds, polite literature is not less indebted to his pen than the fine arts to his pencil. The sound principles and enlarged views inculcated in his lectures entitle them to the attention both of the student and amateur.

LECTURES ON WOOD ENGRAVING.

In our next we shall commence the publication of the very interesting lectures on wood engraving, delivered before the Academy of Design, by Mr. Mason.

SOLUTIONS TO MATHEMATICAL QUESTIONS.

BY J. D. WILLIAMS.

13. Find the least two right angled triangles, in whole numbers, with a common hypothenuse, so that the difference of the squares of the greater leg of one, and the greater leg of the other, shall be a square, and the difference of the squares of the other two legs shall be a square.

To make $z^2=x^2+y^2=x'^2+y'^2$, and $x^2-x'^2=y'^2-y^2=\square$, then $(x-x')(x+x')=[y'-y][y'+y]$. Make $x-x'=-\frac{s}{r}\{y'+y\}$; $[x+x']=\frac{r}{s}\{y'+y\}$ By addition and subtraction I have

$$x=\frac{[r^2+s^2]y'+[r^2-s^2]y}{2rs} \text{ and } x'=\frac{[r^2+s^2]y'+[r^2+s^2]y}{2rs}.$$

But $y'^2-y^2=\square$; let $\therefore y'=m^2+n^2$, $y=2mn$, then

$$x=\frac{[r^2+s^2][m^2+n^2]+[r^2-s^2]2mn}{2rs} \text{ and } x'=\frac{r^2-s^2][m^2+n^2]+[r^2+s^2]2mn}{2rs}$$

Moreover, $x^2+y^2=z^2$ a square, and by substituting and multiplying by the square, $4r^2s^2$, it becomes $[r^2+s^2]^2m^4+4[r^4-s^4]m^3n+6[r^2+s^2]^2m^2n^2+4[r^4-s^4]mn^3+[r^2+s^2]^2n^4=\square$. Make it $=([r^2+s^2]m^2+2[r^2-s^2]mn-[r^2+s^2]n^2)^2=[r^2+s^2]^2m^4+4[r^4-s^4]m^3n+[4(r^2-s^2)^2-2(r^2+s^2)^2]m^2n^2-$

$4(r^4-s^4)mn^3+(r^2+s^2)^2n^4$, this gives $\frac{m}{n}=\frac{2(r^4-s^4)}{(r^2-s^2)^2-2(r^2+s^2)^2}$ where r and s may be taken at pleasure; if $r_{,}=2$, $s=1$, I find $\left\{\begin{matrix} x=5525, & y=9840 \\ x'=4557, & y'=10326 \end{matrix}\right\}$ By the anunciation of the question $x>y$, $y'>x'$, and r and s may be easily taken to fulfil the condition by substituting the general values of m, and n, in the values of x', x, y', y.

15. From Bonnycastle, given $44000x^2+1=z^2$, to find x and z in whole numbers.

SOLUTION BY M. FLOY, JUN. NEW-YORK.

Put $x=\frac{y}{20}$, $z^2=110y^2=1$. From which we have $z=21$. $y=2$. Put $p=21$ and $q=2$. $N=110$, then by the formula given by Lagrange in his additions to Euler's Algebra, we have $z=p^2+Nq^2=881$; $y=2pq=84$. $z=p^3+3Npq^2=36981$; $y=3p^2q+Nq^3=3526$. $z=p^5+10Np^2q^2+5N^2pq^4=65160501$. $y=5p^4q+10Np^2q^3+N^2q^5=6212810$. Now since this last value of y ends with a cypher, let us put $p=65160501$; $q=6212810$. $z=p^2+Nq^2=849178-1781142001$; $y=2pq=809659624435620$, which value of y, is divisible by 20, and hence we have the values of x and z in whole numbers, viz: $x=40482981221781$; $z=8491781781142001$.

SOLUTION TO QUESTION 20, BY JOHN D. WILLIAMS.

From the given equation I easily get $[x^2-40x+289]\times[x^2+2x+1]=x^4-38x^3+210x^2+538x+289=0$, and from the first $x=\sqrt{111}\pm20$, and from the second $x=-1, x=-1$. [See Bonnycastle's Alg. vol. 1 8vo., page 190.]

FIRST STEP TOWARDS A SOLUTION OF QUESTION 21, BY JOHN D. WILLIAMS.

969. 1. 12. 50. 1. 34. 3. 2. 4. 1. 16. 1. 51. 2. 15. 1. 1. 6. 2. 1. 19. 8. 1. 34. 2. 1. 1. 1. 2. 3. 1. 8. 3. 1. 76. 1. 5. 7. 1. 1. 3. 1. 1. 3. 6. 1. 3. 1. 38. 1. 3. 1. 6. 3. 1. 1. 3. 1. 1. 7. 5. 1. 76. 1. 3. 8. 1. 3. 2. 1. 1. 1. 2. 3. 4. 1. 8. 19. 1. 2. 6. 1. 1. 15. 2. 51. 1. 16. 1. 4. 2. 3. 34. 1. 50. 12. 1. 1938. 1. 12. 50, &c.

$$\frac{969}{1}, \frac{1}{1}, \frac{12}{13}, \frac{50}{651}, \frac{1}{664}, \frac{34}{23227}, \frac{3}{70345}, \frac{2}{163917},$$

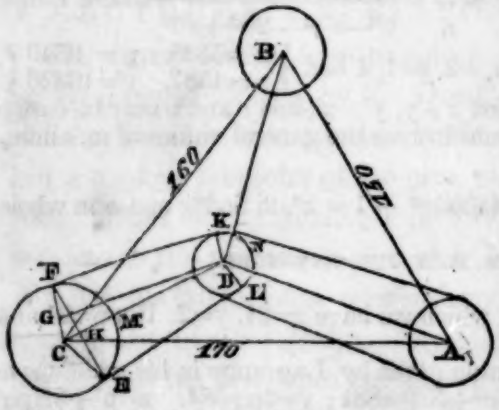
$$\frac{4}{704176847}{726013}, \frac{1}{863163747}{889930}, \frac{16}{14514796799}{14964893}, \frac{1}{15377960546}{15854823}, \frac{51}{798790784645}{823560866},$$

By calculating the above fractions to the 96th term x and y will be obtained.

REDUCTION OF QUESTION 22, BY JOHN D. WILLIAMS.

Given $\sqrt[3]{[7x^3+4x^2]}=28-\sqrt{[20x^2-10x)}$ to fine x. Cubing $7x^3+4x^2=21952-2352\sqrt{(20x^2-10x)}+1680x^2-840x+(10x-20x^2)\sqrt{[20x^2-10x]}$. Transfer $7x^3-1676x^2+840x=21952+\sqrt{(20x^2-10x)}(10x-20x^2-2352)$. Or $7x^3-1676x^2+840x-21952=\sqrt{[20x^2-10x[10x-20x^2-2352]}$. Again, $(7x^3-1676x^2+840x-21952]^2=(20x^2-10x)[10x-20x^2-2352]^2$. By actual involution and multiplication, $49x^6-23464x^5+2820736x^4-3123008x^3+74288704x^2-36879360x+481890304=8000x^6-12000x^5-1887600x^4-1882600x^3+111108480x^2-55319040x$. Therefore by transposition I shall have the following equation of the 6th degree or order: $7951x^6+11464x^5-933136x^4+1240408x^3+36819776x^2-18439680x=481890304$.

SOLUTION TO QUESTION 23, BY JOHN D. WILLIAMS.



Let A, B and C denote the centres of the three opaque spheres, and D that of the luminous sphere; from A to B, being 150 feet, from B to C 160 feet, and from C to A 170 feet; the diameter of the sphere at A being 35 feet, that of the sphere at B 40 feet, and the diameter of that at C 45 feet. Let the circle in the figure denote the common sections of the spherical surfaces with the plane of their centres, draw the tangents KF, LE to the circles KNL, FME, and complete the rest of the construction as in the figure. Put $35=2D$, $40=2D'$, $45=2D''$, $10=2D'''$, and $160=a$, $170=b$, $150=c$, $P=3{,}1415926$ semicir. rad (1). Now it is evident that HM is the height of the segment of the sphere at C, which is illuminated; but $HM=CM-CH=D''-CH$, hence CH is to be found; this may be done by the triangles CFH, CGD; the radius CF, DK are perpendicular to the common tangent FK; and DG is parallel to FK $\therefore$ The figures GFKD is a parellogram $\therefore$ $KD=D'''=FG$ hence $CG=CF-D'''=D''-D'''$. Also, CD= the distances of the centres of the 2 spheres; now the triangle FCD is common to the triangle FCH, CDG, and the angles CHF, CGD are equal; since each of them is a right angle; $\therefore$ these triangles are similar; hence CD : CG :: CF : $CH=\frac{CF\times CG}{CD}=\frac{D''\times(D''-D''')}{CD}$. $\therefore$ $HM=D''-\frac{D''(D''-D''')}{CD}$; but the surface of the illuminated segment (by mensura.) $=2PD''\times HM=2P\left\{D''^2-\frac{D''^2(D''-D''')}{CD}\right\}$ (1) In like manner the illuminated surface of the spheres at A and B are found to be $2P\left\{D^2-\frac{D^2(D-D''')}{AD}\right\}$; $2P\left\{D'^2-\frac{D'^2[D'-D''']}{BD}\right\}$; hence the sum of the illuminated surfaces $=2P[D^2+D'^2+R''^2]-2P\left\{\frac{D^2[D-D''']}{AD}+\frac{D'^2[D'-D''']}{BD}+\frac{D''^2[D''-D''']}{CD}\right\}=$ max. $\therefore$ $\frac{D^2[D-D''']}{AD}+\frac{D'^2[D'-D''']}{BD}+\frac{D''^2[D''-D''']}{CD}=$ minimum [2]; Put $D^2[D-D''']=k$, $D'^2[D'-D''']=m$, $D''^2[D''-D''']=n$. $AD=r$, $BD=r'$, $CD=r''$ and [2] becomes $\frac{k}{r}+\frac{m}{r'}+\frac{n}{r''}=$ mini. [3]; $\therefore$ $\frac{kdr}{r^2}+\frac{mdr'}{r'^2}+\frac{ndr''}{r''^2}=0$, [4]. I have to compute [4]; to the end proposed I put the angle $DAB=x$, then $DAC=A-x$ [A= the angle CAB] then [by trigonometry] $r'=\sqrt{[r^2+c^2-2cr\,cosx]}$ [5]; and $r''=\sqrt{[r^2+b^2-2br\,cos(A-x)]}$ (6); hence $dr'=\frac{rdr-cdr\,cosx+cr\,sin\,xdx}{r'}$ (7); $dr''=\frac{rdr-bdr\,cos(A-x)-br\,sin(A-x)dx}{r''}$ (8)

substitute these values of dr', dr" in (4) and put the coefficient of each of the independent differentials dr, dx separately =0 and then there arise the equations; $\frac{k}{r^2}+m\left\{\frac{r-(\cos x)}{r'^3}\right\}+n\left\{\frac{r-b\cos(A-x)}{r''^3}\right\}=0$(a); $\frac{mc\sin x}{r'^3}=\frac{nb\sin(A-x)}{r''^3}$(b); substituting in (a),(b) their values as given by (5) [6] I have $\frac{k}{r^2}+m\times\frac{r-c\cos x}{[r^2+c^2-2cr\cos x]^{\frac{3}{2}}}+n\times\frac{r-b\cos[A-x]}{[r^2+b^2-2br\cos[A-x]^{\frac{3}{2}}}=0$(c); $\frac{mc\sin x}{[r^2+c^2-2cr\cos x]^{\frac{3}{2}}}=\frac{nb\sin(A-x)}{r^2+b^2-2br\cos(A+x)^{\frac{3}{2}}}$(d); the equations (c) (d) are sufficient to determine the two unknown quantities r, a, which being found the problem is solved.

Remark. It is easy to see that (e) is equivalent to the equation $\frac{m\sin ADB}{c'^2}=\frac{n\sin ADC}{r''^2}$, or $\frac{m\sin ADB}{BD^2}=\frac{n\sin ADC}{CD^2}$(e); (e) can be obtained directly from (3) as follows; for suppose that $\frac{k}{r}$ has been determined so as to answer the conditions of the question, or that $\frac{k}{r}$=const. then $\frac{mdr'}{r'^2}+\frac{ndr''}{r''^2}=0$ (f.) Now as AD=r=const. it is evident that the point D being raised so as to satisfy (f) will describe an indefinitely small arc of a circle (rad. [r] centre A)=ds, and that if r' is supposed to increase, r" will decrease; also, that ds, multiplied by the cosine of the angle made by r, and ds=dr'; but since ds, is perpendicular to r, the cosine of the angle made by r',& ds, is the same as *sin* ADB .·. dr'=*sin* ADB ds; in like manner dr"=—ds *sin*ADC these substituted in (f) give (e); by supposing $\frac{n}{r''}$=const. I have as before $\frac{k\sin ADC}{AD^2}=\frac{m\sin BDC}{DB^2}$[g.] Also, if $\frac{m}{r'}$=const. $\frac{k\sin ADB}{AD^2}=\frac{n\sin CDB}{CD^2}$[h]; the equation [e], [g], [h], are only equivalent to two distinct equations, for one of them is derivative of the other two. If (g) is multiplied by *cos*ADB &[h] by *cos*ADC & the products added, remembering that the *sin*ADC×*cos*ADB+*sin*ADB×*cos*ADC=—*sin*BDC there will arise the equation $\frac{k}{AD^2}+\frac{m\cos ADB}{BD^2}+\frac{n\cos ADC}{CD^2}=0$[i], which is evidently the same as [c] given above. From what has been done it is evident that any two of the equations (e), [g], [h], are sufficient to determine the position of the luminous sphere. The position of the luminous sphere can be found from these equations by the usual methods of trial and error; but it appears to me that the simplest method is to use (c) and (d]; for by supposing a certain value for x, then by (d) [by the solution of a quadratic equation] r, can be found; if then then these values when substituted in [c] are found to reduce it to zero, x&r, have been rightly found. But if [c] does not =0, the difference will be the error; then suppose again x and proceed as before to find another error, which being found, x, will be found very nearly by the method of double po-

sition; and by repeating the process, x, & then r may be found to any degree of accuracy required. It is easy to see when k, m, n, are each positive; that is, when the luminous sphere is less than either of the others, that the question does not admit of minima [considering r, r', r" always positive] and that it admits of an absolute maximum which is had by making r, r', r" infinite, or by removing the luminous sphere to an infinite distance; for in this case half of the surface of each opaque sphere will be illuminated. The contrary will happen when the luminous sphere is greater than each of the opaque spheres; that is, I shall have minima instead of maxima.

QUESTIONS PROPOSED FOR SOLUTION.

BY MR. J. SWINBURNE.

24. Given $x^{9-4}+x^{3-2}-70x^{3-4}-14=y^{2-3}(y^{2-3}+1)$, and $x^{2}-63x^{1-2}=(x^{3}y^{4})^{1-6}$ to determine x and y.

BY JOHN D. WILLIAMS.

25. Given AB and BC in the triangle ABC and the segment of the base DE made by the two lines BD and BE, drawn from the vertical angle to the base—the angle ABE equal to CBD equal to 90 degrees. Required to construct the triangle. [See G. Barron's Correspondence, 1803.]

26. Let a cone whose height is 300 feet, base diameter 60 feet, top diameter 1 foot, be wound round with a cord whose diameter is half an inch, in a spherical manner, until the surface is completely covered to the top. Required the length of rope, and the distance the boy must travel to unwind it, keeping at its extremity. [See Williams' Algebra.]

27. Required the length of a woodbine which laps round a conical pole from the bottom to the top; distance between each lap 13 inches; length of the pole 45 feet; diameter at the bottom 34 inches, and at top 5 inches; and the distance that the boy must travel to unwind it, keeping at its extremity. Note, the woodbine at rising makes an angle of 45 degrees with the base of the pole. [See Ryan's Mathematical Diary, 1831.]

28. Given three spherical leaden balls, of 1, 2, and 4 ounce avordupoise weight, to be suspended by three silk cords of proper length and strength, so that they will vibrate seconds when a well adjusted barometer stands at 29 1-2 inches, and thermometer at 55 degrees, or temperate; and supposing this state of air to remain, and the three pendulums being lifted up to make an angle of 5 degrees from their perpendicular direction with the horizon, and then let swing. Required the numbers of the vibrations each will make, and the time in motion. [McLaurin's Fluxions.]

BY A. B. SANDS, NEW-YORK.

29. The corporation punch bowl is in form of a frustum of a spheroid; the depth is equal to 2-9 of the whole length of the spheroid, and the diameter at the top of the bowl 30 inches, also the conjugate diameter of the spheroid is one half the transverse. Tell how many rounds fourteen aldermen may take with a conical glass whose diameter at the top is 3 1-2 inches and depth 2.

30. Find two pentagonal numbers, such that their sum and difference shall be also pentagonal numbers.

31. Find one or more numbers, greater than unity, which shall be both triangular, pentagonal and hexagonal.